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Municipal Ownership of Gas in the United States.

BY

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PREFACE.

It may be well, in giving to the public this study in municipal economy and administration, to mention the sources of information that have been used. Most of the material was obtained by personal visits to every city, excepting the small town of Bellefontaine, of the nine that own their gas works. These visits were made in August and December of 1890, save in the case of Hamilton, which was visited in June, 1891. Much information was also gathered from all the cities by correspondence with the city officials.

The excellent account of the history of city ownership in Philadelphia, given in an appendix, was written by Mr. W. S. Outerbridge, Jr., a graduate student of the Wharton School of Political Science in the University of Pennsylvania. In its preparation he was much assisted by Mr. Talcott Williams, of *The Philadelphia Press*, and by Mr. C. W. A. Veditz, another graduate student of the Wharton School, who began the work, but was forced by sickness to turn it over to Mr. Outerbridge. Special mention should also be made of the aid received from Superintendent W. C. Adams, of the Richmond Gas Works; Mr. R. T. Cook, secretary of the Alexandria works; Mr. William Cannings, superintendent of the Henderson works, and Mr. F. W. Reutlinger, city clerk of Henderson, Ky.; Superintendent S. M. Darrah, of the

Wheeling works, and Mr. A. A. Franzheim, clerk of the gas department of Wheeling; Mr. S. L. Smith, corporation clerk of Bellefontaine, Ohio; Captain C. A. Ballou, city engineer and superintendent of the Danville, Va., works; Mayor Samuel B. Woods and Superintendent T. J. Williams, of the Charlottesville, Va., works; Mr. Willard Smyers, clerk, and Colonel George H. Phillips, superintendent of the Hamilton, O., works; Mr. Israel Williams, attorney at Hamilton, and many others. Recent articles in the *Gas Light Journal* and the *Progressive Age*, the reports of Philadelphia, of the Massachusetts gas and electric light commission, and other authorities mentioned in the text, have been studied.

No one is better aware than the writer of the probability of some mistakes having crept into the numerous tables or statements here presented, but pains have been taken to make these errors as few as possible. It is hoped that, whatever be the criticism of some of the conclusions presented, there will be general acceptance of the honesty and fullness of the presentation of facts on municipal ownership here attempted.

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Previous Investigations.

Never before has the desire for accurate facts and principles in regard to city ownership of gas works in this country been as great as now. As this is written, in June, 1891, the Massachusetts legislature, heeding the urgent petitions of several of its cities for permission to light their own streets and sell to their citizens, has just followed the recent example of Tennessee in giving such permission in a general law. In Ohio, after all the legal opposition that wealth could produce, the city of Hamilton has successfully completed the first year of city ownership. This is the ninth city in the United States which, with apparent satisfaction at the present time, has entered upon public ownership. Toledo, Ohio, after a most remarkable attempt by a private company generally supposed to be closely affiliated with the Standard Oil Company to block proceedings in the Federal courts, has just begun to furnish its citizens with natural gas through a pipe line of more than forty miles. The extent to which the managers of private gas works are becoming alarmed is seen in the gas journals and in the proceedings of recent conventions of gas companies.

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Said President McMillin, of the American Gas Light Association, at its last meeting in October, 1890: "From this direction [municipal control of lighting] danger to the lighting industry looms up most portentously." On the one hand are to be found the nationalists and another class of less radical thinkers who endorse city ownership. On the other hand we see firm opponents who denounce public ownership from the standpoint of theory and experience. Evidently a calm and thorough study of both the facts and the theory of public ownership of gas-works is in order. This is the more important because only one attempt has been made to give the results of city ownership in a comprehensive manner, and this has already become largely out of date as far as its statistics of United States experiments are concerned, so rapid has been recent growth and change. The investigation in question—that of Mr. B. C. Keeler, in the *Forum* of November, 1889—was also greatly limited in scope by the restrictions of space and character necessarily imposed by a popular review. It nevertheless remains an able treatment of the subject.

The theory of the subject, as well as most of the information then accessible (July, 1886), was ably presented by Professor James in his monograph of the American Economic Association on "The Relation of the Modern Municipality to the Gas Supply." So widely has this monograph been quoted that its influence upon American thought cannot well be exaggerated. But no attempt was made by Professor James to give a full statement of the results obtained in the few American cities then rapidly developing their municipal plants.

Another valuable monograph of this same Association, "The Relation of Modern Municipalities to Quasi-Public Works," published in January, 1888, treats of gas, electric lights and street railways, but as it confined itself to legal aspects of city control, and to such statistics as could be obtained by correspondence, little data is presented as to the exact working of city ownership.

One of the latest studies of the subject that has come to the writer's notice is the Report (No. 91), made by an investigating committee of the Massachusetts senate in April, 1890, after a visit to three of the cities that own their gasworks—Philadelphia, Pa.; Richmond, Va., and Alexandria, Va. This report, whose strong opposition to municipal ownership has been often quoted, is discredited by external and internal evidence of ignorance of the subject and of a misleading use of such facts as are correctly given. A few proofs of this will at once be given. The committee report that they know of only four cities that manufacture and sell to their citizens illuminating gas. Yet there were then eight, as they might easily have learned. Again, Superintendent Adams, of the Richmond gas works, tells the writer that much of the work of investigation in Richmond was done by Mr. M. S. Greenough, gas engineer of the Bay State Gas Company of Boston, who accompanied the committee as an ex parte agent for the apparent purpose of calling the committee's attention to only one side of the question. According to my informant this Bay State Gas Company sent its attorney on a similar errand with the Massachusetts investigating committee of the year before.

Superintendent Wagner, of the Philadelphia gas works, writes of the same report in relation to his city: "I am sure you will excuse me from entering into a controversy with gentlemen who have not even the common honesty of correct quotations in the reports they submit as the result of their investigations." He then points out how the committee quote from his report for 1889, accurately as far as they quote at all, but by omitting what follows they give an altogether false idea. As it illustrates either the bias or the incapacity of the committee, and also furnishes valuable information about the often discussed Philadelphia works, we will quote what the committee copied from Mr. Wagner's report. The italics are the committee's:

"In submitting the foregoing facts and figures, showing a condition of affairs in the management of the city's gas works, which must satisfy any reasonable man that the past year has been not only a year of large profits to the city and of general improvement to the works, but also a year of the manufacture of the best gas ever distributed from these works, *we cannot shut our eyes to the fact that there is a widespread belief that exactly the opposite of this is the case,—that the works are badly managed; that the product is poor and getting worse, and that the whole property had better be sold or given to some one who can do these things better than the present officials.*"

In his report Superintendent Wagner goes on to show, what the committee entirely ignores, that the above belief of some is false, and that the works and the financial results therefrom have vastly improved since city control on a legitimate basis began in 1887 with the overthrow of the gas trust. Mr. Wagner also states, as subsequent careful investigation by Dr. Henry Morton, the president of the well known Stevens Institute, of Hoboken, N. J., has proven, that the gas used by most of the citizens is

excellent, and that, when it is not, the cause is entirely due to insufficient pipes and fixtures, which are being rapidly improved. A full proof of the inaccuracy and unfairness with which the financial results of city management are handled by the committee will be deferred until the condition of the city works in question is described. Suffice it now to say that in order to show a loss from city management, the committee value the gas consumed by the city in streets and public buildings at less than a private company would sell it, and place among the expenses interest and taxes on a *vastly inflated valuation* of the plant, far above the present cost of duplication.

The report of the Massachusetts house of representatives on April 13, 1891, (No. 434) contains accurate but brief statements as to Philadelphia, Wheeling and Richmond.

Practical Details of City Ownership.

Nine cities in the United States now own their gas works. Their population, according to the census of 1890, the date of beginning ownership and date of financial year for which full returns have been obtained, are given in Table I.

Four of the nine cities are in Virginia, one is in West Virginia, two are in Ohio, one is in Kentucky and one in Pennsylvania. Three began city ownership from thirty-eight to fifty years ago, although real control by the people is only four years old in Philadelphia. All the cities save Hamilton, O., having tried city ownership more than fourteen years, rightfully claim that the matter has with them passed beyond the stage of experiment.

TABLE I.

Name of City.	Population.	Date of beginning City Ownership.	Financial year for which returns have been received.
Philadelphia, Pa.....	1,046,964	1841	Jan. 1—Dec. 31, 1890.
Richmond, Va.....	81,388	1852	Jan. 1—Dec. 31, 1890.
Alexandria, Va.....	14,339	1853	June 1, 1889—May 31, 1890.
Henderson, Ky.....	8,835	1867	June 1, 1889—May 31, 1890.
Wheeling, W. Va....	35,013	1870	April 1, 1889—Mar. 31, 1890.
Bellefontaine, Ohio..	4,238	1873	July 1, 1889—June 30, 1890.
Danville, Va.....	10,305	1876	Jan. 1—Dec. 31, 1890.
Charlottesville, Va...	5,562	1876	July 1, 1889—June 30, 1890.
Hamilton, Ohio.....	17,565	1890	May 1, 1890—April 30, 1891.

As far as my inquiries could be carried—and all citizens whom I could meet in the cities visited, or on the trains going to and from them, were questioned—general satisfaction prevails over the results of city ownership. No one expressed any desire to return to private ownership, or any faith in the objections of many writers that city ownership is dangerous paternalism, or interference with private rights, or that it leads to corruption of politics through an enlargement of the number of offices. But more of this later. As several of the cities have lately refused good bids for the lease or purchase of their works by private companies, this is a good proof of the general satisfaction with city ownership. Says Mayor Fitler, of Philadelphia, in his annual report dated April 6, 1891:

"During my term of office a number of inquiries have been received from other cities asking for information in reference to our gas and our water works—whether the city owned the plants,

and if she did what was the revenue from them, and how they were managed. In each and every case I have found that the inquiry came from places where the gas and water works were owned by private corporations, and that the municipality desired to purchase them, and not a single inquiry came from cities which owned their works and which desired to sell them."

Returning to the above table it will be noticed that four cities have a population of from 4,238 to 10,285, one city has nearly 20,000, one 35,052, one 80,838, and one over a million. Thus most types of cities, as regards size, are represented. It is so hard to get full returns by correspondence that it has been found better in most cases to give the returns for the year for which returns were obtained on my visits to the cities in August and December, 1890. When later returns have been received by mail, use will be made of them as far as possible. Unless otherwise stated, the dates will be those first given in the last column of Table I.

Leakage.

It is impossible to prevent all leakage in the distributing pipes. Beyond a certain point that varies according to cost of the mains and rate of interest thereon, it is cheaper to allow some leakage than further to improve the mains. A little gas is also necessarily used at the works and in the office, but undoubtedly leakage beyond 10 per cent. is excessive, and is due to failure to expend sufficient money in the renewal of old mains, as they rust out, and in the exchange of small mains for large ones as consumption increases, or is due to lack of good and sufficient holders. Where the mains are too small it becomes necessary, if the gas in the burner is to be good, to put on such a pressure at the works as to

TABLE II.

Name of City.	Amount of gas made in holder.	Amount of gas used in burner.	Percentage of gas in holder borne by leakage, gas used at works and unaccounted for gas.
Philadelphia.....	2,177,073,000 feet made. 1,134,922,000 purchased. 3,311,995,000 feet.	2,857,589,286	13.72
Richmond[1].....	196,990,600	173,343,500	12
Alexandria.....	About 19,712,000	16,659,948	About 15.5
Henderson.....	11,626,000	9,998,330	14
Wheeling.....	131,320,800	115,540,480	12
Bellefontaine.....	8,760,000	8,235,400	6
Danville[2].....	11,013,600	9,900,400	10
Charlottesville.....	6,717,000	5,865,000	9.9
Hamilton.....	30,425,600	27,131,900	10.8

cause greater leakage, and in some cases when carried very far, even blowing of gas in many burners. This blowing indicates that more gas is being forced through the burner than is properly consumed, and meters will record an unduly large amount of gas.

The need of larger mains is fully realized in Alexandria and Philadelphia by the mayors and gas officials, and improvements are rapidly being made in the latter city, and are strongly urged in the last address to the council by the mayor of Alexandria. Mr. R. T. Cook, secretary of the Alexandria gas works, writes under date of April 21, 1891, stating that probably after July something will be done to improve the street mains and benches at the works, and thus diminish the leakage and lessen the cost of

[1] In 1889 the amount made in Richmond was 185,162,200 ft., and amount used was 166,769,887; so the leakage was 10 per cent.

[2] During 1889. In 1890, owing to a freshet which much injured the works, the leakage was 15 per cent. The works were repaired as soon as possible.

making. Philadelphia has a good excuse in the fact elsewhere explained that only for four years have the people had any real control of gas matters. The works in the hands of that parody on popular government, a gas trust independent of public control, naturally were not kept in good condition. But with the overthrow of that trust in 1886, the merits of city ownership in Philadelphia have for the first time had a fair test. The recent increase of leakage in Richmond is due to leaks in the holders which could not be adequately repaired because the city council has thus far failed to appropriate the money asked for by the superintendent for a new holder, and the old holders could not be dispensed with long enough to permit of repairs during the winter of 1890–91 when the leaks became large. The superintendent writes, however, that he expects to make the needed repairs during the coming summer and thus to "reduce the leakage to the minimum."

Now the important question is—do private gas works have less leakage on the average than do public? Comparison can be made with fifty-eight gas companies in Massachusetts in the year ending December 31, 1890, for which alone any reliable figures on this point are accessible. Only those companies are taken which not only make gas, but also deliver to private consumers. In Boston the leakage is 8.44 per cent., Brockton 18.42, Fall River 14.11, Charleston 13.31, Lawrence 8.12, Lowell 4.94, Lynn 12.63, Worcester 5.69, Chelsea 14.91. The average rate of leakage, found by dividing the sum of the leakage rates by the number of cities, was 11 per cent. while in the cities owning their works it was 11.3 per cent.; and leaving out Alexandria 11 per

cent. The average leakage found by dividing the total leakage in feet in all the cities by the total amount made in these places was 9.34 per cent. in Massachusetts, and in the public gas works 13.5 per cent. But this is hardly a fair comparison owing to the vast preponderence in the sum totals of Philadelphia, whose large leakage is due to the sad condition of the works when handed over to the mayor by the gas trust four years ago. Despite the rapid progress since 1886 the poor leaky mains over thirty years of age will not be entirely replaced by good ones for two or three years yet. If Philadelphia be excluded, the average leakage in the other eight cities in 1889 or 1890 was 12 per cent., and in the fifty-eight cities, outside of Boston, in Massachusetts, it was 10.7 per cent. In the matter of leakage, then, there is not much to choose between the public companies of the United States and the private companies whose accounts have been published. The leakage in Hamilton was 21.9 per cent. the first six months of the year which was the first year of city ownership and fell to 4.89 per cent. during the last half of the year. The average for the present year is therefore likely to be much below 10.8 per cent.

Price of Gas and Number of Consumers.

We next consider the price of the gas sold, the amount of the gas consumed per capita, the number of consumers, the ratio of consumers to population and the amount of gas consumed per consumer, though from 1 to 13 per cent. (even 43 per cent. in Hamilton) of what is included under this head is burned on the streets and in public buildings, as

given in a later table. Reference is always made to gas in the burner, not in the holder.

TABLE III.

Name of City.	Price of gas per 1000 feet.	Amount of gas consumed per capita.	Number of Consumers.	Percentage of population borne by consumers.	Amount of gas consumed, per consumer.
Philadelphia...	$1.50	2,734 ft.	134,555	12.9	21,237
Richmond[1] ...	1.50	2,140 "	6,508	8.0	26,482
Alexandria....	1.62 Reduced Sept. 15, 1890 to $1.44.	1,148 "	800	5.5	20,825
Henderson	1.50 Reduced Feb., 1891 to $1.25.	1,132 "	351	4.0	28,485
Wheeling.....	.75	3,301 "	3,300	9.4	35,012
Bellefontaine..	1.00	1,915 "	387	9.0	21,280
Danville.....	1.50	945 "	494	4.2	21,734
Charlottesville.	1.50	977 "	450	7.5	13,033
Hamilton.....	1.00	1,544 "	612	3.5 It will soon be 5 or 6.	45,000

The prices in Table III are those charged when payment is prompt. In the following cities the prices are higher when payment is delayed. In Richmond 5 per cent. is added; in Charlottesville and Hamilton, 10 per cent. is added; in Wheeling the price becomes $1.00, and in Danville $2.00. There are few delinquents to pay these higher prices. In the report of the Massachusetts gas commissioners, dated January, 1891, it is stated that "The average price to consumers for coal gas of twenty-four companies, making annually more than 30,000,000 feet each, is $1.39 per thousand feet. The average price of the remainder of the coal gas companies is $2.015, making an average for all of $1.446 per thousand." These figures are found, not by averaging rates, but by dividing the total amount received for gas in all the cities by the total number

[1] After 1891 the price is to be $1.25.

of feet burned. The average price thus found in Massachusetts would be higher than the average price in the nine public companies were it not that Philadelphia, from its large output of gas and its comparatively high price for the sake of a very large revenue to the city, brings up the average to $1.46. In Massachusetts, however, the cost of making is from ten to twenty cents per thousand feet greater than in the cities along the Ohio river, but less than in Virginia. The average rate in Massachusetts, $1.97 in the sixty coal gas companies, much exceeds that of the public owned works, which is only $1.32.

Perhaps a fairer comparison would be that between public and private companies in Virginia, West Virginia, Ohio and Kentucky, where alone both kinds exist. According to "Brown's Directory of American Gas Companies" for 1891 it appears that there are eight private gas companies in Virginia. Of these one charges $3, one $2.70, three charge $2, two $1.60 to $2, and one charges $1.40. Three of the public companies charge $1.50, although Richmond at the end of the year will reduce to $1.25, and a fourth charges $1.44.

In West Virginia one of the five private companies charges $2.25, two charge $2, with some discount for prompt payment, one charges $1.60 and one $1; Wheeling asks only 75 cents.

In Pennsylvania fifty-five of the eighty-nine private companies charge over $1.50, and twenty-nine charge $2 and upwards. Eight charge $1.50 as in the public works of Philadelphia, and twenty-six charge from $1 to $1.45. Of the latter, eight located where gas coal is much cheaper than in Philadelphia, such as Alleghany, Pittsburgh, Monongahela, Meadville

and Titusville, charge only $1. Philadelphia in reality, however, gets her gas also for about a dollar, since the extra fifty cents is clear profit which she covers into the city treasury.

In Ohio of the forty-three private companies only four charge $1, the price of the two public companies, and one charges 95 cents. The company charging the latter price is at Hamilton and was charging $2 until the construction of the public works compelled the reduction. The pressure must be so great, however, to carry the gas through the small mains, that the many citizens met by the writer in Hamilton believe that the city gas is really cheaper. The four private companies in Ohio charging $1 for gas in whatever quantity are at Cleveland, Columbus, Sandusky and Troy. In Cleveland and perhaps in the other cities the reduction to $1 was forced by the city councils in accordance with Ohio law.

Milwaukee and three cities in Illinois charge $1 per thousand, and two companies in Terre Haute, Ind., in fierce competition for the time being and using some new process of manufacture, are charging, according to Brown's Directory, only 35 cents. Wheeling has the lowest price of any cities known to the writer in the five states where there are any public-owned gas companies, and in Ohio, West Virginia, Virginia and Kentucky the price of the public companies is as low or lower than that of any of the private companies. In Kentucky none of the eighteen private companies sell as low as $1.25, the price in Henderson.

Philadelphia, acting on a principle to be discussed later, prefers to keep the charge for gas at $1.50, though all costs are only 84 cents and are yearly fall-

ing, in order to secure gas free for public use, and also a large cash income. Similar reasons keep the prices in most of the other cities considerably above cost. This point must always be kept in mind in comparing the prices of public and private companies. The charges on Prussian state-owned railways, for example, may not be much, if any, lower than with us, but the net income from them more than pays the interest on the entire state debt of about $1,100,000,000. Similar financial results are reported by Mayor Fitler, of Philadelphia, in his report, dated April 6, 1891, wherein he says that "either the water works or the gas works, now the property of the city, could be mortgaged for a sufficient sum, at four per cent. per annum, to pay the balance of the city debt not now in the sinking fund, and after paying the interest on such a mortgage, either of the works would yield to the city a credit balance of not less than $500,000 annually. The value to the city of Philadelphia of these two properties will never be realized until she loses either of them, and I sincerely trust that the day is far distant when either of these great and valuable properties will be either leased or sold."

The amount of gas used by each consumer in the cities owning their works is about the same as in Massachusetts, where the consumption in fifty cities is from 10,000 to 31,000 feet per consumer. The rest of the Massachusetts cities show from 31,000 to 45,000 feet.

Very interesting is the comparison of the per centage of gas consumers to the total population in the ten Massachusetts cities, where the net price for gas

is less than $1.60. The percentages are given in Table IV.

TABLE IV.

Name of City.	Percentage of population borne by consumers.	Average price of gas.
Lowell	11	$1.10
Haverhill	7.2	1.40
Boston	6.4	1.23
New Bedford	6	1.52
Spencer	5.6	1.25
Lawrence	5	1.41
Taunton	4.8	1.47
Worcester	4.6	1.50
Holyoke	3.9	1.58
Fall River	1.9	1.57
Average	5.64	$1.40

The average is only 5.64 while the average percentage in the nine cities owning their works is 7.1. This is very singular, since the predominance of negroes, who use little gas, in most of the cities owning their works, fully counterbalances the foreign-born population in the Massachusetts cities. The differences in price are insufficient to account for it, as the average price in the nine public companies was $1.32, since reduced to $1.27, and in the ten private companies it was $1.40, a difference of only 8 cents. We seem then to be driven to the same remarkable conclusion in regard to gas as were the commissioners on sources of water supply for the city of Syracuse, N. Y., made February 1, 1889. They found, on a careful investigation of about 250 towns, that even where prices were the same there was, as indicated by meters and number of faucets, a much greater use of water furnished by public than by private companies. The probable explana-

tion is that the average American has an instinctive dislike for patronizing a monopoly further than is possible, especially where its profits are popularly supposed to be large. On the other hand, extensive use of public works whose revenues seem to a degree his own, and likely to lessen his taxes, is not so much begrudged.

Coal.

In Table V are given the average candle power of the gas, the feet of gas in the holder per pound of coal, and the cost of gas coal per long ton delivered at the works.

TABLE V.

NAME OF CITY.	Candle power.	Feet of gas in holder per pound of coal.	Cost of gas coal per long ton, (2240 pounds).
Philadelphia	19.85	4.77	$3.89
Richmond	19.34	4.85	3.35
Alexandria	17	4	3.79
Henderson	19	4.50	2.38
Wheeling	17	4.68	1.58
Bellefontaine	16	4.73	3.36
Danville	17.5	5.03	5.01[1]
Charlottesville	18.5	3.7	3.75
Hamilton	17	4.82	2.78[2]

The average candle power of these nine cities is 17.9, although by far the larger part of the gas sold is over 19.3. The average candle power, as revealed by 413 official inspections of 59 gas companies in Massachusetts, in 1890, was 17.79. So here again the public works show a slight advantage. It should be said, however, that in New York, Baltimore,

[1] Price since the summer of 1890 reduced to $4.41.

[2] Price at the beginning of 1891 raised to $2.59.

and several other large cities, a candle power of from 21 to 25 is claimed by the companies. The candle power in Philadelphia is steadily increasing. This is considered by gas engineers to be possible only by the use of water gas, of which something will be said in another place.

A great factor in the cost of gas is the price of coal and the amount of gas to be gotten from a ton. Suppose, for example, that 4.5 feet can be produced in the holder per pound of coal, as is true of all but two of the works just cited. Then from 2,200 pounds of coal, neglecting 40 pounds as loss of coal in handling, we have 9,900 feet of gas. Assuming 12 per cent. leakage and unaccounted-for gas in distribution, 8,712 feet would reach the burner. Now a difference of a dollar in cost of coal, if distributed over 8,712 feet, means 11.5 cents per thousand feet. If the yield of the coal were 4.7 feet to the pound and the leakage 8 per cent., then 10.5 cents per thousand feet of gas must be allowed for every change of a dollar in the price of gas coal. This is important. Gas companies often justify fifty cents higher charge in one place than in another of similar size, by a difference of one to two dollars a ton in price of coal. Yet a difference of $2.00 a ton in coal involves only from 20 to 23 cents difference per thousand feet in the cost of gas. Frequently, too, a gas company which pays a high price for coal can recoup itself by advantages in the sale of residuals, or in other ways. It will be noticed that in all but two cases the yield per pound of coal in the above nine cities is from 4.5 to 5.03 feet. The average, owing to the poor yield in Charlottesville and Alexandria, is 4.57. It will be further noticed that, save

in Wheeling and Danville, gas coal costs from $2.38 to $3.89 per ton. The cost of gas coal in some Massachusetts companies, selected by the Massachusetts gas commissioners for special study in 1889, was 40 to 43 cents per thousand feet in the holder, or from 43 to 47 cents in the burner, indicating about $4.00 to $4.50 as the price of coal in that state.

In addition to gas coal, from 2 to 5, or rarely 10 per cent. of cannel coal or a half gallon of oil per thousand feet is often added, to insure the candle power or "enrich" the gas. Philadelphia, in 1891, used 5,000 tons of cannel coal for this purpose, costing $6.78 a ton, in connection with about 200,000 tons of gas coal, costing $3.89. In Richmond, where gas coal cost $3,35, five per cent. of cannel coal was used, at $6.58 per ton. No other enricher, excepting such small proportion of cannel coal, was used last year in any of the public works.

Cost of Labor and Other Items.

The writer has learned the cost of coal per 1,000 feet in the holder in only three cities. In Philadelphia in 1890 it was 37.3 per cents; in Bellefontaine 38.6 cents; in Henderson 33 cents. The cost of coal, of labor, of other items (aside from improvements, interest and taxes) and the receipts from residuals sold, and also the net cost of gas on every thousand feet of gas used in the burner are given in Table VI.

It is difficult to fill out the above table for Philadelphia, since, for reasons to be given later, one-third of the gas is made by a private company, and sold in the holder to the city. It is thus hard to compare the costs of labor, etc., with other cities. The gross cost in the holder in Philadelphia of the 2,177,073,000

TABLE VI.

Name of Place.	Cost of coal per M in burner.	Cost of labor per M in burner.	Cost of other items, save interest, taxes and improvements, per M, in burner.	Receipts from residuals and other items, per M in burner.	Net cost per M in burner.
Philadelphia.....	43.2¢	.....	.....	14.6¢	70.0¢
Richmond.....	34.6	47 ¢	6.6¢	11.6	76.6[1]
Alexandria.....	50.0	41.9	12.0	8.2	94 7
Henderson.....	38:4	34.0	9.7	7.5	74.6
Wheeling.....	20.8	27.2	2.5	16.3	34.3
Bellefontaine	34.2	26.4	1.9	18.1	44.5
Danville.....	50.6	47.8	8.0	8.4	98.0
Charlottesville....	52.8	35.2	4.9	5.1	87.8
Hamilton.....	30.2	33.7	8.8	24 3	48.4

feet manufactured by the city in 1890 was 73 cents, of which 37.3 cents was cost of gas coal and cannel coal, and 35.7 cents was cost of lime used for purifying, and other materials, and of wages and salaries in approximately the ratio of one-third for materials and two-thirds of the 35.4 cents for labor. From the 73 cents gross cost must be deducted 13 cents for residuals or by-products, coke, tar, etc., leaving 60 cents as the net cost in the burner of the coal gas made by the city. The cost of coal and price of residuals sold, as given above, were calculated only on gas manufactured by the city. There was bought of a private company 1,134,922,000 feet of water gas in the holder for 37 cents per thousand, and mixed with the coal gas, reducing the cost of all the gas to 52 cents in the holder. To this must be added 18 cents for distribution expenses, such as leakage,

[1]In 1889 the net cost in Richmond was 76.1, because of better market for coke and less leakage. Residuals sold for 13.1¢.

repair of mains, meter inspectors, clerical labor, etc. Thus the total cost of gas in the burner is 70 cents.

Philadelphia, according to the late superintendent, Mr. Wagner, in a conversation with the writer, would make its own water gas, and would make it even cheaper than 37 cents, if not prevented from incurring the necessary expense for plant by constitutional limitation on indebtedness. This is also the reason assigned for not owning the electric lights. It seems to be a mistake thus to limit indebtedness or taxation so arbitrarily. It would probably be a sufficient check on rash action if a city council were simply forced to secure direct indorsement from the voters for increased debt or taxes. The reason given for water gas being sold to the city for 37 cents in the holder, while the coal gas made by it costs 60 cents, is that water gas can be made cheaper in Philadelphia than coal gas, and that, a fixed and regular amount of water gas being supplied hourly or daily through the year, it can be made cheaper than if subject to the irregularity of demand, to which the city, dealing directly with the consumer in all seasons, is subjected. A prominent gas engineer in the east tells the writer that he believes the private company is not making any money at 37 cents, but is trying thus gradually to secure control of the city works. The truth of this cannot, of course, be determined by any outside party.

In all the cities except Philadelphia no attempt has been made to keep separate the expenses in the holder and in the burner. Labor, it will be noticed, varies from 26.4 cents in Bellefontaine to 47.8 cents in Danville, and 47.2 in Richmond. The largeness of this

item in the latter city is due to the lack of sufficient storage capacity, or of a water gas attachment which can be fired when a large supply of gas is needed. An exclusively coal gas plant cannot be so quickly increased in capacity, and then diminished as need requires. Consequently there must always be enough men on hand to supply the place of machinery and storage capacity where the latter is deficient, and to run the coal gas plant to the height of its capacity during the few hours of every evening when needed. The cost of coal per thousand feet in the burner varies from 20.8 cents in Wheeling to 54.4 cents in Danville. The usual cost is from 23 to 40 cents. In Massachusetts, in companies selected for study by the gas commission, the labor cost is from 14 to 20 cents. But this only includes the making. If the labor cost of delivery were added the entire sum might equal that of the public companies. The latter probably pay more to common labor, the former more to the officers. There is little difficulty in training any laborer of ordinary intelligence to do nearly all the work necessary in gas-making. A gas engineer of first-class ability as superintendent is about the only skilled labor required aside from the clerical work.

The cost of repairs, improvements and miscellaneous items, varies from 1.9 cents in Bellefontaine to 12 cents in Alexandria, where the worn out condition of some of the plant requires large expenditures for running the works as well as for improvements. No attempt was made by the writer to determine the value of the water, usually supplied from city mains, used by the gas works. But this

item is known to be less than a cent a thousand feet in amount.

Residuals.

The receipts from residuals, such as coke and ammonia, as appears in the last table, vary from 5.1 cents in Charlottesville to 13.1 cents in Richmond, nearly as much in Philadelphia, and 24.3 cents in Hamilton. This is an important element in reducing the cost of gas making. In six selected companies in Massachusetts, according to the report of the gas commissioners of that state for 1889, the sum received for residuals varied from 13 to 23 cents in the holder, which, allowing 10 per cent. leakage, would mean 14 to 25 cents in the burner. Residuals, then, find a better sale in Massachusetts, and, so far as that item goes, gas ought to be cheaper in Massachusetts than in these nine cities under consideration. An analysis of the value of the various by-products will soon be considered. Meantime attention is called to the last column in the above table, giving the net cost exclusive of improvements, interest and taxes, but including ordinary repairs, such as are needed from day to day. This net cost varies from 34.3 cents in Wheeling to 98 cents in Danville. In six of the nine companies it is below 77 cents. The higher prices in the other three are due to high cost of coal and small size of city, as in the case of Danville, or insufficient and leaky mains, as in Alexandria.

As remarked in the preface, if any success has been won by city ownership, and the price of gas been made lower, or the net revenue to the city been greater, or political corruption, as we shall soon see,

been less than in most private works to such an extent as to make all cities that have tried public ownership overwhelmingly in favor of its continuance, the result cannot be ascribed to any better natural conditions of success than exist in most American cities. In fact, several of these cities, by virtue of their large negro vote, which is usually ignorant if not corrupt, would appear to be less favorably situated for public ownership than most northern cities.

TABLE VII.

Name of City.	Tons of coal carbonized.	Pounds of coke obtained per ton (2240 lbs.) of coal.	Pounds of coke sold per ton of coal.	Pounds of coke burned at works per ton of coal.	Lbs. of coke unsold per ton of coal.	Gallons of tar sold per ton of coal.
Philadelphia	203,734.5	1,170	683	478	9	....
Richmond[1]	17,818	1,471.6	617	742	112.4	10
Alexandria	2,200	.....	239	...	....	9.6
Henderson	1,153.4	.....	394	...	....	2
Wheeling	15,175	.....	811.3	...	....	14.4
Bellefontaine	894.6	.....	447	...	....	11
Danville	1,126	.....	....	...	....	..
Charlottesville ...	790.8	.....	182	...	....	..[2]
Hamilton	2,922	.....	754	...	....	14.2

We now study the coke obtained as chief of the by-products. In Table VII are given the amount of coal (long tons of 2240 pounds) carbonized or used in the retorts, the amount of coke obtained per ton of coal carbonized, and likewise the amount of coke sold, the amount burnt at the works and the amount left on hand unsold in 1890 per ton of

[1] The figures for Richmond are for 1889.

[2] The tar is used on the streets in Charlottesville.

coal carbonized. Finally, the amount of tar sold per ton of coal carbonized is given.

The chief column in Table VII is that giving the pounds of coke sold per ton of coal. Although a ton of coal will make fully half as much by weight of coke, a considerable part of this is used for fuel in making the gas. Six of the above cities sell from 394 to 811 pounds of coke for every 2240 pounds of coal carbonized. It will be noticed also that ten to fourteen gallons of tar are obtained from a ton of coal, and sold, when not used in the streets for paving. From tar are made pavements, roofs and valuable aniline dyes, which have largely displaced vegetable dyes.

TABLE VIII.

Name of City.	Pounds of coke sold per M of gas burned.	Gallons of tar sold per M of gas.	Price of coke per bushel (40 pounds.	Price of tar per bbl. (50 gallons.	Value of the coke sold per M of gas.	Value of the tar sold per M of gas.
Philadelphia	74.6	....	....	....	8.9 ¢	4.2 ¢
Richmond[1].	73	1.8	6 ¢	$ .65	11	1.4
Alexandria.....	31.5	1.2	6.26	1 25	5	3.2
Henderson.....	46	2+	5	2.25	5.7	1.1
Wheeling	100	1.8	2.8	2.14	7.1	7.6+
Bellefontaine	45.2	1.1+	8	4.00	9.05	9.05
Danville	.....	....	10	1.75	....	....
Charlottesville....	24.7	....	8	....	5.1	....
Hamilton[2].....	73	1.4	6 & 7	3.60	11.3	9.9

In Table VIII are given the amount of coke and the amount of tar sold per thousand feet of gas

[1]Richmond receipts are analyzed for 1889. In 1890 sales of coke were about 1.5 cents less, but full details are not at hand.

[2]The figures for Hamilton in this table cover only the first ten months of the year.

used in the burner. Also the price of coke per bushel of forty pounds and of tar per barrel of fifty gallons. There is given the value of the coke and of the tar sold per thousand feet of gas.

The wide difference shown in prices for coke and tar in these cities is not to any great degree due to the management of the works, but to the market for these by-products. Coke is often lowest where coal is cheapest, and vice versa, for a cheap coal district is often possessed of coke ovens which give a great supply at low prices. Thus the high price of coal in some districts is partly atoned for by the accompanying receipts for residuals. Owing to the gradual displacement of coal gas by water gas, which furnishes no tar nor coke for sale, the market for these residuals is improving. Coke is usually sold in the city where it is made, but tar is sometimes sent long distances. Danville, Virginia, for instance, sells its tar in Chicago.

Only two cities of the nine under consideration find a sufficient market for ammonia to make it profitable to save. Richmond obtains seven-tenths of a cent and Wheeling 1.4 cents for ammonia. Ammonia is now used not only in medicine but in the arts.

Total Cost of Gas.

In Table IX we repeat a column given on a previous page as to the cost of gas apart from permanent improvements, interest and taxes. Then is given the cost of such improvements, the cost of gas including the latter item, the percentage of the price of coal borne by all the residuals, and the cost of coal less the amount obtained for residuals.

TABLE IX.

Name of City.	Cost of gas per M feet in burner, apart from improvements.	Cost of permanent improvements.	Total cost of gas aside from interest and taxes.	Percentage of the price of coal borne by all the residuals.	Cost of coal per M less residuals.
Philadelphia.....	70 ¢	14 ¢	84 ¢	33.8%	28.6 ¢
Richmond.....	76.6	6.9	83.5	35.5	23
Alexandria.....	94.7	26.2	120.9	16.4	41.8
Henderson.....	74.6	13	87.6	19.5	30.9
Wheeling.....	34.3	5.8	40.2	78.2	4.5
Bellefontaine	44.5	....	44.5	53.	16.1
Danville	98	16.6	114.5	16.6	42.2
Charlottesville....	87.8	12	99.8	96	47.7
Hamilton.....	48.4	....[1]	45 6	81	5.9

The expenditure for improvements was unusually large in Alexandria, owing to a new holder, and will continue large for the next two years if needed improvements, such as the city officials desire, are made. Expenditures in Danville, Henderson and Charlottesville will be less than given in the table, while in Bellefontaine and Hamilton they are likely to be more. In the list of expenses no allowance has been made for the cost of caring for the public or street lamps, which is often assumed by the gas works, but has nothing to do with the cost of making and delivering gas.

The total cost of gas, exclusive of interest and taxes, is under 50 cents in Wheeling, Bellefontaine and Hamilton; from 80 to 90 in Richmond, Philadelphia and Henderson: and from $1.00 to $1.21 in Charlottesville, Danville and Alexandria. The

[1]All permanent improvements the first year in Hamilton are included in the cost of the works.

reasons for the high cost in the three latter cities can profitably occupy us a moment, even at the risk of repeating what is said elsewhere. In Charlottesville the cost with improvements was almost $1.00 in 1890, but owing to the need of few further improvements will be little more than 90 cents for a time. This is a good type of a small city, with high price of coal and a very poor market for residuals. The cost of coal less the residuals is 47.7 cents per thousand feet of gas consumed as compared with 4.5 cents in Wheeling. Few cities are worse off in this particular than Charlottesville. Then credit should be given the gas works in Charlottesville for the tar used in the city streets, and worth perhaps two or three cents per thousand feet. The high total cost in Danville of $1.14½ is likewise due in part to a high price of coal accompanying a poor market for residuals. The cost of coal in Danville less the receipts from residuals was 42.2 cents in 1890. Injury to the works by a freshet involved expense of repairs as well as, for a time, greater cost in making gas. Permanent improvements also cost 16.5 cents. In spite of all this, to keep the cost of gas down to $1.14½ is indicative of good rather than bad management.

Little excuse can be made for Alexandria, which seems to be the only city of the nine whose gas management is now open to serious criticism. The chief trouble, as far as could be ascertained, seems to lie, not in the superintendent and not in any spoils system among the employees (for few changes have been made for political reasons, at least of late years), but in the short-sightedness of the city council in not renewing and improving the mains and

works as they wore out, or as increased consumption and the inventions of the times rendered wise. The result now is that while the cost of gas in 1890 was 94.7 cents, or next to Danville, which has also apparently been rather dilatory until lately in making improvements, 26.2 cents had to be spent on improvements, and more than that will be needed during the next three years in order to place the works abreast of the times. As the city government now gives evidence of some appreciation of the situation and of an intention to improve the works at once, the outlook is hopeful. And even in Alexandria the citizens are getting their gas for $1.44, or much less than scores of American cities of similar size which have an equal market for coal and residuals.

Value of the Works and Indebtedness.

It remains to determine the indebtedness on these gas plants, and, in order to compare them with private works, the amount to be allowed for interest and taxes. On none of the works are any taxes levied, but such amount as would have to be paid by a private company should be added to the cost of making, when comparing the financial results of public with private management. In the matter of interest, where the works have been paid for without higher charges for gas than a private company would have imposed, the case is more doubtful. Is it not one great advantage of public ownership that, provided the works are kept abreast of the times out of the income, there is no necessity of paying interest? As, however, some of the gas companies in question, notably Philadelphia, may for the sake of revenue have charged more than a private company would

have done, and as it is commonly believed that public companies could not be successful if they had to pay interest, a full allowance will be made for this item.

Five of the nine cities under examination have paid for their works out of their earnings. Of the other four, Philadelphia, Danville, Charlottesville and Hamilton, it may be said that Hamilton, having only just completed its works at a cost of $160,000, has had no time to pay for them, while Charlottesville owes only $20,000, of which $8,500 was incurred for improvements in 1889. It is the intention of the authorities to cancel this debt soon. In Danville likewise there is a debt of $30,000 at five per cent., for recent improvements. The original debt of $30,000 for the works has yet some years to run, but I was informed that the works have more than paid for themselves out of their net earnings. The debt on the Philadelphia works is $3,500,000 at 6 per cent. payable between January 1, 1899 and January 1, 1905. There is a large amount in the sinking fund, $2,200,000, toward the payment of these loans, so that the net indebtedness is only $1,300,000. In most of the nine cities money can be borrowed by the municipalities at 4½ to 5½ per cent., but 6 per cent. interest and 2 per cent. taxes, a very liberal allowance on the actual value of the works, will be computed.

The difficult point is to determine what this actual present value is. Very evidently it is not to be formed by a capitalization of the net earnings, for the net profit after the payment of six per cent. interest and taxes are what we are seeking. Nor will it do to value the works at their entire cost to date. Much of the original plant has been displaced by

larger and better. A large part, too, of that still in use could now, owing to fall in price of material, be built for much less than it originally cost.

Suppose that a factory in a competitive business costs $100,000 and makes a net profit of $10,000, which, we will assume, is considered an average profit on a new investment. Now suppose that after eight years rival factories of equal efficiency are built for $70,000 each and are content, consequently, with $7,000 profit. The first factory will have to sell its goods at $7,000 profit if it would continue to compete, and therefore the factory would no longer be valued at $100,000, but at $70,000, which may be looked at as a capitalization of its earning power, but which, because of freedom of competition, is virtually equivalent to the cost of duplicating equally efficient works. The $30,000 depreciation has been counted off as part of the expenses during the five years. Evidently the same rule ought to be applied to a monopoly, as Professor James so conclusively proved in his monograph of the American Economic Association.[1]

The illustration used by him, while much like that just given, deserves quotation. Too much light can not be thrown on this popular fallacy of all monopolies that a corporation is justified in earning dividends forever, on all the capital ever invested in the works. Says our authority—

"If a man goes into the manufacture of cotton cloth, and finds that he must tear down and rebuild his factory, he is prevented from keeping the cost of the old mills in his capital account, by the simple fact that, if he does so, another man who is willing to come in and invest a sum of money equal to that which the new

[1] "The Relation of the Modern Municipalty to the Gas Supply," pp. 66-7.

will cost can compete with him on the basis of the existing cost. In the same way, if a new process makes his old machinery useless, he must simply throw it away, charge it up to profit and loss, and begin again. In this way the interests of consumers are continually guaranteed, so that they always obtain commodities on the same basis of their cost of manufacture with the newest and most approved processes. The old capital is thus continually cleared away and the basis for a regular and rapid economic advance is secured."

On examining the reports and inquiring of the gas superintendents of the nine cities in question, it was found that they had fallen into the habit of private monopolies, and valued their works at the capitalization of their earning power, on the basis of the entire cost of the construction of the works and of all subsequent improvements. For some purposes, as, for example, in valuing the works for sale, no objection can be made to capitalizing earning power. But since we are seeking to separate from the purely monopoly profits the cost of gas making as cost is determined in competitive business, viz., by market rates of interest and profit on the real present cost of the plant, we must here adopt another principle.

We must find the present cost of duplicating works of the present efficiency and of substantially the same character. To do this was not found so difficult as was feared. The plant in every city was divided into four grand divisions,—(1) the street mains, (2) meters and services, the latter being a technical name for the connections between the street mains and the house meters, (3) the land used by the gas works, (4) the holders and manufacturing plant. In most cases it was found that, with a little calculation, the superintendents could give these items. It is easy to determine the value of the street mains, on the supposition that they are as good as

new, which exaggerates on the side of overvaluation, if one knows the lengths of the pipe of each size, the weight of the various sizes by the linear foot, such as standard tables give, the value of iron pipe by the ton, laid alongside the trench and the cost per foot of laying. The cost of meters and services can be easily found by multiplying the average value per consumer by the number of consumers. A large contractor, Messrs. R. D. Wood & Co., recently estimated that the cost of new meters and services in Nashville, Tenn., would be $16.00, and iron pipe, delivered in the streets, $26.66 per ton. The cost of 2,541 meters and 10,076 services in Philadelphia in 1889 was $96,779.68, which is at a somewhat lower rate per meter and service. While all pipe of a given size is not of the same weight, the weight does not usually exceed the following—

For	2-inch	gas	pipes,	9	pounds	per	linear foot.
"	3	"	"	14	"	"	"
"	4	"	"	23	"	"	"
"	6	"	"	33	"	"	"
"	8	"	"	44	"	"	"
"	10	"	"	54	"	"	"
"	12	"	"	82	"	"	"
"	16	"	"	108	"	"	"
"	20	"	"	160	"	"	"

The land is usually in a part of the city where its value is not great. The main works, such as the holders, benches for making the gas, scrubbers, purifiers, engines, boilers, station meters, etc., have been so recently renewed in part in most of the works that a pretty reliable estimate could be made by the superintendent. On such figures, which are certainly correct within 20 per cent., and are more likely to be too large than too small, I have relied in the next table.

TABLE X.

	Condition of plant at close of 1890.	Condition in 1887.	Percentage of present plant added 1887–'90
Manufactur'g capacity daily	15,800,000 ft.	8,800,000 ft.	44.3
Holder capacity	14,908,000 ft.	12,138,000 ft.	18.6
Services, Number of	158,905	129,788	18.3
Meters, Number of	133,290	117,546	11.8
Pipe over 6 inches in diameter	167.25 miles	134.25 miles.	19.7
Total pipe of all sizes	998.3 "	863.3 "	13.5

One exception was made. No computation was secured from the Philadelphia authorities. Therefore a computation was made by the writer in the way now to be explained. It appears from the report of the gas department of 1890 that $817,667.48 have been spent in the last four years for improvements and extensions. By comparing the work accomplished with this money with the entire plant, it appears that this expenditure has increased the capacity of the works in every way fully 25 per cent. Then $817,667.48 must be equal to one-fifth the present value of the works exclusive of land. The entire value exclusive of land must therefore be approximately $4,088,327.40. Add the land and a very liberal margin for possible undervaluation and $7,000,000 will be the maximum cost of duplicating the entire city works. Inasmuch as a vast quantity of the distributing system is very old, some of it dating back 51 years, it is much more likely that the works in their present condition could be duplicated for $6,000,000, including the land. As this conclusion is important, and will be made the basis for another deduction, it may be worth while to give more in detail the way in which the $817,667.48 has been

expended. The figures do not include the plant of the private water-gas plant of the Philadelphia Gas Improvement Company, which the city has the option of purchasing at any time.

The percentage of the value of the present plant added from 1887 to 1890 inclusive must thus average 20 per cent., but to avoid all criticism we may assume the average to be 18 per cent. If now $817,667.48 will increase the plant 18 per cent., the entire plant can be built for $4,542,600. Including the land $7,500,000 is a high estimate for the entire plant. As just stated, $7,000,000 is probably more accurate. In 1885 Mr. Henry C. Lea carefully estimated the value of the entire plant to be $5,775,000, as stated in Appendix D. Only about $1,000,000 has since then been spent upon the works. But we will henceforth in allowing for interest and taxes, assume the value to be $7,500,000.

TABLE XI.

Name of City.	Total cost of land and of duplicating the works.	Amount of capital thus estimated to every M feet of gas in the burner in 1860.	Value of the land.	Value of the manufacturing plant.	Value of the distributing system.
Philadelphia	$7,500,000	$2.96	$500,000	$	.....
Richmond	592,800	3.48	11,000	225,600	356,800
Alexandria	76,206	4.57	400	27,000	28,806
Henderson	60,166	6.00	2,000	20,000	36,166
Wheeling	380,000	3.20	5,000	170,000	205,000
Bellefontaine	42,000	4.75	200	.....	.....
Danville	55,560	5.61	6,000	39,000	15,960
Charlottesville	34,000	5.79	2,000	17,000	15,000
Hamilton	ab't 175,870	6.48[1]	5,214	ab't 65,000	ab't 105,655

[1] Only $6.37 if we omit expense for public lamps.

The plant in Richmond cost between $800,000 and $900,000, but can now be duplicated for $592,800, according to the various items of cost given by the superintendent. The value of the plants of the several cities, based, with the exception of Philadelphia, on estimates by the superintendents as in Richmond, together with the valuation per thousand feet of gas made in 1890, is given in Table XI.

Of the 2,857,589,286 feet burned in Philadelphia only 1,878,378,584 feet are made by the city, but all is delivered through city pipes. The cost of a distributing system in a large city equals the cost of the manufacturing part of the plant. So to the gas made by the city is added half of that made by the water gas company in determining the capital per thousand feet. So rapidly is the consumption increasing in Hamilton, with little corresponding need of increase in the plant, that that city will, during the present year 1891–2, undoubtedly show a capital of less than $5 per thousand feet. In the large cities, Philadelphia, Richmond and Wheeling, the capital is from $2.50 to $3.50, and in none of the other and smaller places does it exceed $6.00, except temporarily in Hamilton. In fact, it is over $5.80 only in Henderson, Kentucky.

We now have a basis for judging private companies. The question simply is, are they trying to earn dividends or interest on a capitalization above from $2.50 to $6.50, according to the size of the city and other real differences in the cost of the plant? In Boston, Mass., according to the last report of the state gas commission, the Bay State Company, with an output of 139,242,970 feet, which was sold exclusively to other companies, and therefore required no

capital for distribution, is capitalized at $35.99½, or say $36.00, for every thousand feet sold. The other company—the Boston— with an output ten times as great, is capitalized for only $1.89, or an average on all the gas used in Boston of about $3.50. But since the compilation of the report there must have been a vast increase of capitalization, for in the *Progressive Age* of February 16, 1890 (one of the leading gas-light journals of the country), it is stated that a consolidation in the hands of a Delaware corporation has been effected of all the gas companies of Boston, South Boston, Dorchester and Roxbury, and that on their combined output of 1,758,300,643 feet $17,000,000 of stock and bonds have been issued, or $9.67 per thousand feet. No comment is needed. The average capitalization outside of Boston and its suburbs was $8.54. Including Boston, the average, according to the report of the gas commission, was $8.84, and, according to reported later developments, still more. *The average in the nine public companies was only* $4.56 if we omit Hamilton, because just beginning, and $4.77 if we include Hamilton.

From the statistics ot capital and output given in the gas directory for 1890 of Mr. E. C. Brown, editor of the *Progressive Age,* the capitalization per thousand feet in the fifteen largest cities giving full returns, was found to be as follows:

New York	$6.48	Washington	$3.25
Chicago	13.58	Milwaukee	2.59
Brooklyn	5.01	Jersey City	13.42
St. Louis	19.50[1]	Louisville	7.32
Baltimore	14.70	Omaha	5.30
San Francisco	11.76	Rochester	9.09
Cincinnati	6.50	St. Paul	9.09
New Orleans	20.25		
		Average capitalization ...	$9.85

[1]The bonds alone in St. Louis are $9.45 per thousand.

Thus an average capitalization in private owned works of nearly three times that in the public works of corresponding size reveals that in these private companies for every dollar cost of duplicating the works there are nearly $3.00 for stock and bonds out, on most of which a good income is obtained. The same excessive over-capitalization prevails in most of the smaller cities. In Massachusetts the stringency of the law against stock watering and the oversight of the gas commission have diminished but not eradicated the evil.

In England laws against stock watering and the example of many cities owning their gas works keeps the capitalization far below ours. President Hepworth of the Incorporated Gas Institute, a great association of gas engineers of Great Britain, stated in his address as president in 1891, that he endorsed the estimates of other gas experts, whom he named, that in medium and large sized gas works the capitalization should not exceed eleven shillings or $2.75 a thousand feet.[1]

In a letter from England in the *American Gaslight Journal* of July 27, 1891, we read:

"One reason why gas is sold cheaply here is that anything in the way of 'watering' the stock is uncommon. As a general rule the capital stands at the sum actually paid in, the whole of which has been expended for bona fide capital purposes, such as the purchase of lands, erection of plant, laying mains, etc. At the last meeting of the Plymouth Gas Company, which enjoys the honor of supplying the cheapest gas in England, the chairman told the shareholders that the sole reason why the company were able to supply gas so cheaply was that their capital stood at the low rate of $8.40 per ton of coal carbonized, (about 94 cents per thousand feet of gas) whilst that of other companies is considered moderate if below $20, (about $2.25 per thousand feet) and often ranged as high as $40 per ton of

[1]The address is given in the *Progressive Age*, July 15, 1891.

coal, (about $4.50 per thousand feet). This simply meant that 8 cents per 1,000 cubic feet was sufficient to pay full dividends, whereas other companies required 20 to 30 cents. Taking the working expenses as the same, the difference between 8 and 20 or 30 cents went to the consumers, and the Plymouth Gas Company were, therefore, able to sell at 12 to 20 cents cheaper. This is the case in fact, the Plymouth price being 42 cents, and other companies of similar size ranging from 50 to 60 cents."

The Cost of Gas with Interest and Taxes.

We are now ready to determine the cost of gas with the inclusion of interest and taxes on the value of the plant, whether the city has in fact to pay interest and taxes or not.

TABLE XII.

Name of City.	Cost of gas without interest and taxes.	Amount of interest at 6% and of taxes at 2%.	Am't of interest and taxes per 1000 feet.	Cost of gas with interest and taxes.
Philadelphia....	84 cents.	$600,000	23.7 ¢	$1.08
Richmond.....	83.5	47,424	27.3	1.11
Alexandria.....	120.9	6,096	36.6	1.58
Henderson.....	87.6	4,813	48	1.36
Wheeling.....	40 2	30,400	26.3	67
Bellefontaine...	44.5	3,360	38	83
Danville	114.5	4,445	44.9	1.59
Charlottesville..	99.8	2,720	46.4	1.46
Hamilton	48.4	14,070	51.9	1.00

The interest and taxes in Philadelphia were divided among one-half of the feet of gas supplied by the private company as well as among the feet of gas made by the city as in Table XI. It will be noticed that the total cost of gas, even counting interest and taxes at a high rate, when none at all have to be paid in two cases, is in the case of three companies from 67 cents to $1.00; in the case of two more it is from $1.00 to $1.10, and in the case of the other four,

each of which has under 15,000 population, the cost runs from $1.36 to $1.60.

It is not at all certain that private companies, under the same conditions of prices of coal and residuals and of consumption, do not average as well. It is certain, however, that few if any private companies give the public the benefit of their ability to manufacture cheaply as do these nine cities. The lowest prices for gas, however, known to the writer are 75 cents in South Framingham, Mass.; 30 cents in Jackson, Mich.; 35 cents in Terre Haute, Ind. and 50 cents in Hyde Park, a suburb of Chicago, in all of which a new patent process is being tried. No other private company is known to the writer as charging below a dollar. But Wheeling charges seventy-five cents, and Hamilton and Bellefontaine might do so if they did not wish an income for other uses. Gas was temporarily sold for fuel purposes in Columbus, Ohio, in a few houses in 1890 as an experiment for 50 cents, but the experiment has been for a time discontinued.

Comparison of Cost of Gas in Public and Private Companies.

The following comparison between the price of gas in public and private companies in Virginia, West Virginia, Ohio, Kentucky and Pennsylvania, where alone both kinds exist is so favorable to public ownership as to be most interesting:

According to "Brown's Directory of American Gas Companies" for 1891, it appears that there are eight private gas companies in Virginia. Of these one charges $3, one $2.70, three charge $2, two $1.60 to $2, and one charges $1.40. Three of the public

companies charge $1.50, although Richmond at the end of the year will reduce to $1.25, and a fourth charges $1.44.

In West Virginia one of the five private companies charges $2.25, two charge $2 with some discount for prompt payment, one charges $1.60, and one $1; Wheeling asks only 75 cents.

In Pennsylvania fifty-five out of the eighty-nine private companies charge over $1.50, and twenty-nine charge $2 and upwards. Eight charge $1.50, as in the public works of Philadelphia, and twenty-six charge from $1 to $1.45. Of the latter, eight located where gas coal is much cheaper than in Philadelphia, such as Allegheny, Pittsburg, Monongahela, Meadville and Titusville, charge only $1. Philadelphia in reality, however, gets her gas for about $1, since the extra 50 cents is clear profit, which she covers into the city treasury.

In Kentucky none of the eighteen private companies sell as low as $1.25, the price in Henderson, which owns its works.

In Ohio, of the forty-three private companies, only four charge $1, the price of the two public companies, and one 95 cents. The company charging the latter is at Hamilton, and was charging $2 until the construction of the public works compelled the reduction. The pressure must be so great, however, to carry the gas through the small mains that the many citizens met by the writer in Hamilton believe that the city gas is really cheaper. The four private companies in Ohio charging $1 for gas in whatever quantity, are at Cleveland, Columbus, Sandusky and Troy. In Cleveland, and perhaps in other cities, the

reduction to $1 was forced by the city councils in accordance with Ohio law.

Wheeling not only charges less than is charged in any other city in any of the states possessing public-owned works, but less than all but three or four companies apparently in the United States, and the lower price recently charged in these seems due to a fierce war of rates or to new processes of manufacture whose value is being tested.

A most valuable official statement as to the cost of gas by a large private company—the Laclede—in St. Louis, was made under pledge of secrecy, in March, 1889, to a commission of the city council that was then considering the propriety of leasing the Laclede works. After the consolidation of all the gas companies of St. Louis under one management, and in answer to a popular demand, the figures were given to the public and are to be found in the St. Louis *Globe-Democrat* of December 30, 1889. As this is the only recent revelation of the cost of gas making in a large private company, the following details will be of interest: With coal at $3.65 a ton and coke selling at 7.4 cents per bushel, and a good market for tar and ammonia, so that 7.2c per thousand feet of gas in the burner could be secured therefrom, the total cost including taxes, but exclusive of interest and profits, was declared to be 71 cents. The cost, however, exclusive of lighting, was 68.9 cents. Coal cost 39.2 cents. After deducting 24.5 cents for residuals, 14.7 cents was left as a balance of cost on the coal. Labor cost 37.1 cents, repairs 5.2 cents, taxes 3.1 cents and miscellaneous expenses, such as for oil, lime and insurance, 8.7 cents.

Improvements since the consolidation of the gas companies have, according to a good authority, reduced the cost to possibly 65 cents. Let us assume, however, that the cost is still 68.9 cents, and that the capitalization should be $4.00 per thousand feet, or $1,415,480. If our previous computation means anything, $4.00 for such a large output is ample. Then the company, after paying all taxes, could still make 8 per cent. if it sold gas at $1.00. The price is now $1.18, and the St. Louis city council were recently defeated in the courts when attempting to reduce the price to $1.00. According to an official statement of this Laclede company, as given in the *Progressive Age*, July 1, 1891, a net profit of $232,425 was made on a sale of 351,621,300 feet of gas January 1 to May 31, 1891, or 66 cents per thousand feet. Assuming the cost of duplication of the works to be $4 per thousand this means 18.5 per cent. profit. If this same gas were sold at 90 cents the profit would be 38 cents per thousand or 9.5 per cent. on a capitalization of $4, and 7.5 per cent. on a capitalization of $5. If 66 cents profit is secured by selling at $1.18, evidently the cost of manufacture and delivery aside from interest is only 52 cents.

Another evidence of the cost of gas making is furnished in the report of one of the largest contractors of gas supplies in the country, Messrs. R. D. Wood & Co., of Philadelphia, to a committee of the city council of Nashville, Tennessee. The city having some thought of owning its gas plant, engaged Mr. Wood to send to Nashville an expert gas engineer. His report secured at some expense is published herewith. (See Appendix D.)

Though referring to the conditions of one city only, its conclusions, with such modifications as other conditions in other cities require, can be easily accommodated to many other plans. It will be noticed that this estimate of Mr. Wood provides for a capital of $600,000, but states that only $547,000 would be needed for 100,000,000 feet, the balance being required for increasing the capacity to 200,000,000 feet. It is known to the officials of Nashville that through some misapprehension the value of the land was placed at least $27,000 too high. The actual capital needed according to this estimate, therefore, when thus corrected as to the value of the land, would be $520,000, with a necessary increase to $600,000 as the output doubles. Now interest at 4½ per cent., the rate now enjoyed by the city, state taxes at one per cent. (an over estimate), and two per cent. for the sinking fund, gives 7½ per cent. on the $520,000, or $39,000. This means 39 cents per thousand feet on an output of 100,000,000 feet. The cost of making and delivering, exclusive of interest, sinking fund and taxes, is placed by Mr. Wood at 80 cents as a maximum.

It was afterwards stated by an expert gas engineer who studied the whole situation carefully, that it was his personal opinion that with good management the cost need not be much over 60 cents. The entire cost of making and delivery was then, according to this authority, from $1.00 to $1.25, with, of course, a prospect of some reduction of cost with increase of consumption of gas.

The figures of Richmond, Va., indicate that the above estimate is none too high. In Richmond, it will be remembered, the cost, exclusive of the eight

per cent. allowed for interest and taxes, was 83.5 cents, but coal costs fully five cents per thousand feet more, and coke brings five cents more than in Nashville. Then the Tennessee city ought to make gas for at least 73 cents. Interest and taxes might add 39 cents more at first, but with the larger consumption interest and taxes per thousand feet would fall. In Richmond, for example, a city of only one-twelfth more population than Nashville, where the consumption is 173,000,000 feet, the cost of interest and taxes has fallen to 27 cents. Needed improvements in holder capacity at Richmond might raise this interest charge to 30 cents, but it would be counterbalanced by the reduction in the labor cost of gas making. With as good management as at Wheeling, where labor is 20 cents less than in Richmond, Nashville ought to make gas as cheaply as Wheeling into 20 or 25 cents, which represents all the differences in price of coal and residuals, or for 60 cents to 65 cents exclusive of interest, etc. The cost of gas making per thousand falls rapidly with increase of quantity up to about 100,000,000 feet yearly. After that the fall in cost is much slower. That one company can afford to supply a city cheaper than two because of savings in salaries, duplication of mains, etc., is well known.

Before leaving this topic of the cost of gas making it will interest some to learn of other figures on the subject obtained by the committee of the Nashville city council, in December, 1890, and January, 1891, and still awaiting action in that city, since no decision has yet been reached. Bids have been received from two large and responsible eastern companies for simply making the gas and delivering to the city

in the large holders, the city to take entire charge of the delivery. The bids were for ten years, the city at the end of that time to purchase the works at an appraised valuation if a mutually satisfactory contract were not then made. But at such appraisal only the then value of the plant, independent of cost or earning power was to be considered. One company bid for water gas, the other for coal gas, but agreed to bid on water gas if desired. Both agreed to allow constant city inspection of the gas, the pressure and measurement, to guarantee an excellent quality of gas, and to pay, at a fair value, for such part of the works of the present private company as could be utilized.

If the city should give the use of the land, the price offered was in each case 75 cents per thousand feet in the holder, but with the statement or understanding that a lower price would be offered when official bids should be called for. The cost of delivery, including leakage and interest, it was thought by these thoroughly competent parties, would not exceed 50 cents and might be considerably less. The minimum cost was thus placed at $1.25, with a probability of its being somewhat below that. This may be as low as the city could make at present. It is hard to determine exactly. The adoption of such a plan would on the one hand cut off a city from the advantages of improvements during the period of the contract, and on the other hand would render the transition to complete ownership easy, and would be acceptable to many who are still too greatly impressed, as it seems to the writer, with a fear of political corruption or mismanagement if the city should supply gas as it does water.

The representative of a syndicate stated to the Massachusetts committee on manufactures in January, 1891, that his company would agree to sell gas in the holder in Boston for 50 cents a thousand feet. The writer knows of a large city in New York where the cost in the holder of excellent water gas, made from Lima oil, is only 28 to 32 cents. It is needless to say that the citizens do not, to any considerable degree, profit by this cheapness of manufacture. At Hamilton, Ohio, the cost of gas in the holder has been only 28 to 35 cents a thousand feet since November, 1890.

In Massachusetts, taxes in 1890 averaged 8.2 cents per thousand feet sold. In Table XII the allowance for taxes was 2 per cent. This, being one-fourth of the entire allowance for interest and taxes, would be 6 cents for Philadelphia, 7 cents for Richmond, 9 cents for Alexandria, 12 cents for Henderson, 6½ cents for Wheeling, 9½ cents for Bellefontaine, 11¼ cents for Danville, 11½ cents for Charlottesville and 13 cents for Hamilton. It is perhaps well that we allowed 8 per cent. for interest and taxes, since this estimate will provide a margin of about 2 per cent. for sinking fund in most cities just beginning ownership. But no criticism can be passed on Alexandria, Charlottesville and Danville, which have to pay no taxes and little interest, if they choose to sell gas for less than sufficient to earn 8 per cent. on the investment.

Profits.

We will now see what are the profits on the cost of duplicating the plant, which are earned by selling the gas at the prices actually charged. Taxes will first be neglected, since none are paid, but they are

afterward deducted. All gas used by the cities on streets and in public buildings will be estimated for our present purpose at the same price as that sold to private consumers. This is not a claim, as might be thought at first, that the city in every case would have to pay as much as this to a private company. Rather the intention is to set over against the price charged for the gas by the public companies the profits realized at that price.

TABLE XIII.

Name of City.	Price of gas in 1890 per thousand.	Cost of gas per M in burner.	Profit per thousand.	Profit on value of plant.	Profit after deduct'g 2 per cent. taxes.	Profits includ'g permanent improvements and deducing taxes.
Philadelphia.....	$1.50	84 ¢	66 ¢	22.4%	20.4%	24.5%
Richmond.....	1.50	83.5	66.5	19.5	17.5	19.
Alexandria.....	1.56[1]	120.9	35.1	5.4	3.4	11.4
Henderson.....	1.50[2]	87.6	62.4	10	8	10.5
Wheeling.....	75	40.2	34.8	10.6	8.6	10.1
Bellefontaine	1.00	44.5	55.5	11.2	9.2	9.2
Danville.....	1.50	114.5	35.5	6.8	4.8	8
Charlottesville....	1.50	99.8	50.2	8.6	6.6	8.7
Hamilton.....	1.00	48.4	51.6	7.96	5.96	5.96[3]

Table XIII shows that profits, after allowing 2 per cent. for taxes, vary from 3.4 per cent. in Alexandria to 20.4 per cent. in Philadelphia. It is 17.5 per cent. in Richmond, 4.8 per cent. in Danville, and from

[1] Average price for the year. It was $1.62 until September 15, and then $1.44.

[2] Price in Henderson has been reduced for 1891 to $1.25.

[3] All permanent improvements in Hamilton the first year, such as services and meters, have been classed as part of the original cost or value of the plant.

5.9 to 9.2 per cent. in the other cities. If the amount spent for permanent improvements be added to the net profits, as many contend it should be, and much of it undoubtedly should, the net profit after similar allowance for taxes, rises to over 8 per cent. everywhere save in Hamilton; the profit thus calculated would be 24.5 per cent. in Philadelphia. The profit in Richmond would be 19.5 per cent., and in most of the other cities about 10 per cent.

These figures speak for themselves. They show a fair profit in all the cities, and in Philadelphia and Richmond a very large profit. In the case of these last two cities critics allege that the large profit is due to the allowance of $1.50 on the gas consumed by the city. A private company might supply gas for $1.25 in Philadelphia. Therefore a calculation has been made of the net profit that these two cities would clear after deducting 2 per cent for taxes, provided the 551,459,572 feet of gas used by the city of Philadelphia be rated at $1 a thousand feet, and the 44,599,400 feet so consumed in Richmond be rated at $1.25. The net profits in Philadelphia would then be 16.7 per cent., and in Richmond 16.1 per cent., after deducting the permanent improvements and 2 per cent. for taxes. But while a private company might sell to the city of Philadelphia for less than $1.50 it would not sell for less than $1.20, unless it did better by the city than the private gas companies do by New York. This is the proof: In the New York papers of April 24 and 25, 1891, appeared the contracts for lighting the public lamps of New York. I quote from the *New York Daily Continent* of April 25:

"Mayor Grant presided at a meeting of the gas commission yesterday, Controller Myers and Public Works Commissioner Gilroy

also being in attendance. Contracts for lighting over 23,000 gas lamps throughout the city until December 31 were awarded, as follows: Consolidated Gas Company about 14,000 lamps at $11.66⅔; Mutual Company, 300 lamps at $11.66⅔; Standard Company, 3,000 lamps at $8.69⅓; Equitable Company, 1,000 lamps at $8 (these two latter corporations being limited by their charters to these comparatively low figures.) The Central Company, about 2,500 lamps at $18; Northern Gas Company, 2,000 lamps at 18.64; Yonkers Company, 500 lamps at $18.64; and the New York and New Jersey Globe Gaslight Company (Limited) 150 lamps at $14.75, higher figures being obtained in these last instances, owing to lack of competition in the Annexed District. The members of the commission manifested considerable dissatisfaction with the high prices demanded. Controller Myers voiced this feeling by saying, 'I think it is frightful that we should have to pay the Yonkers Company at the rate of $28 yearly, only showing a reduction of $2 in fifteen years. We ought to notify them that they should come down $5 at least.' It was decided that Secretary McCormick should confer with the companies on this subject and suggest lower prices for 1892."

The average rate for eight months was $12.57, or for twelve months $18.85. Applying this rate to the 440,558,181 feet of gas burned in the 28,013 public lamps of Philadelphia in 1890 we find the rate per thousand feet to be $1.20. Even the bid of the Consolidated Gas Company of $16.66 is equivalent to $1.11 per thousand feet. The cost of distributing gas in Philadelphia, owing to the vast distances, must fully equal that in New York.

Public Consumption.

In Table XIV are given the total amount of gas used annually in the burner in the nine cities, amount used by the city in its streets and public buildings, the percentage so used, and the cost of gas per thousand feet in the burner, if borne entirely by the gas privately consumed, i. e. sold to private consumers, neglecting interest and taxes, but including improvements.

TABLE XIV.

NAME OF CITY.	Total feet consumption in burner	Amount used by the city in feet.	Percentage of total gas so used.	Cost of gas per M. in burner if borne entirely by the gas privately consumed, neglecting interest and taxes.	Cost as in last column, only including interest and taxes.
Philadelphia..	2,857,589,286	551,459,572	19.3	$1.04	$1.34
Richmond	173,343,500	44,599,400	25.6	1.10	1.49
Alexandria....	16,659,998	2,395,800	14.4	1.43	1.84
Henderson ...	9,998,330	1,857,830	18.5	1.07	1.67
Wheeling.....	115,540,486	22,823,580	19.7	50	.83
Bellefontaine.	8,841,000	2,071,000	23.4	58	1.08
Danville	9,900,400	581,400	5.9	1.22	1.69
Charlottesville	5,865,000	2,100,000	35.8	1.55	2.43
Hamilton	27,131,900	11,620,400	42.8	84.6	1.75

By comparing the last columns of this table with the third column of figures of Table IX and the last column of Table XII the enhancement of price to the private consumer necessitated by the gas publicly used will be seen. Little objection can be made to enhancement of price on this account when the price to the private consumer does not exceed that which a private company would be likely to charge. This is probably the case in the above nine cities save in Philadelphia, where the unusually large proportion of small house owners who object to direct taxes leads to the effort to secure a very large income from the gas works.

There is one valid criticism, however, that may be made in this connection. The fact of public gas manufacture in Philadelphia and possibly elsewhere, seems to lead to wasteful use of gas in public buildings and on the streets. It would be easy to stop most of this, if each city department were charged with the gas used, as a private consumer would be. The words of retiring Superin-

tendent Wagner, of Philadelphia, on this head, deserve perusal. He says:

"The increase in the quantity of gas used by the several city departments, and for which neither money nor credits pass to the bureau of gas, continues with unabated rapidity, and now amounts to as much as the total private consumption in 1864.

	Cubic Feet.
The quantity of free gas burned in 1887 was	506,499,881
" " " " 1888 "	536,158,081
" " " " 1889 "	521,401,101
" " " " 1890 "	551,459,572

"The falling off in 1889 was undoubtedly due to the persistent efforts of the officers of the bureau of gas to stay this waste; but as 'the gas cost nothing,' at least in the estimation of those who thus misuse the city's property, this condition of waste will continue until councils provide by ordinance that all the departments using gas shall pay for it, out of appropriations made to them for that purpose.

"This, of course, would be taking money out of one pocket and putting it into another; but this process, apparently an absurd one, is better than to take it out of both pockets and dissipate it into the air, of use to nobody.

"Show, for instance, by an item in the appropriation ordinance that the amount of gas burned in one building has increased from 1889 to 1890 7,105,100 cubic feet, valued at $10,657.65, and in another institution 1,193,400 cubic feet, valued at $2,240.10, and somebody with authority will order a halt of such willful waste.

"The value of the gas works to the city, and the annual profits to the taxpayers will never be placed fairly before the people at large until some account is taken of the immense quantity of gas used in this manner."

Decline in Price.

According to Mr. A. R. Foote, now of the United States Census Bureau, in an article in the *Electrical World*, March 2, 1889, the average price of gas in 290 cities in 1878 was $3.15 per thousand feet. In 1887 the average price in the same cities was $2.00, a decrease of 33 per cent. in nine years. The average price in 1881 in the seven cities owning the gas

works from which returns for that year have been secured, were $2.01, and in 1890 $1.28, or a decrease of 36.1 per cent. An equally large decrease in price, though precisely the percentage is not known to the writer, occurred in the other city, Alexandria, which then owned its works. Since the assumption of the works by the city of Bellefontaine in 1873 the price has fallen from $3 to $1, while the price in Hamilton fell at once, when city ownership began in 1890, from $2 to $1.

Effect of Electricity on Gas.

It is the almost universal experience, no exception having come to the writer's notice, that electric lighting, a short time after its introduction in any place, has increased rather than diminished the use of gas. The sales of gas for private use and in public lamps in Massachusetts, e. g. increased 3.7 per cent. in 1890 over 1889. The reason is plain. Owing to many improvements in manufacture, gas much superior to that in use ten years ago is sold cheaper than electric lights, and the latter are confined to the streets and stores. People become so used to brilliant light there that they want more in their homes and consequently burn more gas.

The consumption of gas is also increasing rapidly in many places, because of its growing use for fuel purposes, since natural gas led the way and taught people the great convenience of using gas stoves. Reduced rates are given in many cities for gas so used, and the most improved gas stoves are being extensively advertised and cheaply sold by the more

progressive gas companies. Says an editorial in the *Progressive Age*, May 1, 1891:

"The supply of gas for fuel by the gas companies of the country is increasing daily. In the city of New York we are informed that many of the new flat buildings, erected for renting to the middle and better class of tenants, have been fitted up with gas ranges in place of the coal ranges that have heretofore been installed in such apartments. This is true of Chicago, Boston and other of the larger cities, and even the smaller country towns advise us that their demand for gas for heating and cooking uses has taken a wonderful stride within the past twelve months."

In the *American Gaslight Journal* of June 8, of this year, appeared the following:

"In a circular recently issued to the shareholders of the Standard Gaslight Company, of this city (New York), we find it stated that President Andrews, at the last annual meeting, asserted that statistics proved that the growth of gas consumption in New York city for forty years prior to the introduction of electricity for lighting purposes averaged about 10 per cent. per annum; that is, the gas output doubled every ten years, and that the city had doubled in population every seventeen years. Since the first introduction of the electric light, however, the increase in New York of the consumption of gas had been much more rapid. It almost immediately jumped up to 12 per cent. per annum, and in 1887 showed a growth equal to about 14 per cent. per annum, a ratio of growth that was still further exceeded in the years 1888–89–90. In fact, he was willing to stand by the statement that the gas output of New York was doubling itself now in a period of six and one-half years, instead of ten years, as before.

"He thought one reason for this very rapid increase was due to the fact that the electric light had educated the human eye in the aggregate for more light and that people are not at all satisfied with the volume of light that formerly satisfied them. Again, a more luxurious mode of living is constantly prevailing in the city, as in all great cities, which is shown in the great increase in the use of gas for cooking and heating purposes.

"In conclusion, President Andrews thought it was safe to say that at no time in the history of the gas industry, from its beginning in this country some sixty odd years ago to the present time, has the outlook been more promising. Indeed, at no time has it been so inviting for the investment of capital as at present, and it may be stated as a settled fact that the electric light, at least in New York city, is not at all a competitor with gas to the injury of the latter."

A final proof is the experience of England. In 1882 one person in every eighteen burned gas; in 1889 one in every seventeen, while each consumer increased his consumption on the average 19.18 per cent.

In an able article by Mr. George H. Christian, before the annual meeting of the Ohio Gas Light Association, it was claimed that, owing to the greater utilization of heat in gas stoves than of coal in coal stoves, 15,000 feet of good coal gas is equal in heating capacity to one ton of hard coal. It is generally estimated that about two to three feet of artificial fuel gas, technically so called, and one to two feet of good water gas, have the same heating capacity as one foot of coal gas. At that rate coal gas would have to be sold at forty cents per thousand feet, or fuel gas at twenty cents, to equal hard coal at $6.00 a ton. If improvements in gas making continue at the present rate, in a few years this price can be attained. As has appeared in these pages, the cost of making gas, exclusive of interest and taxes, is already down to forty cents in Wheeling, equivalent to hard coal at $6 a ton, and to less than forty-six cents in Bellefontaine and Hamilton. Neither interest nor taxes have to be earned in Wheeling and Bellefontaine.

But for most kinds of cooking, where a fire is needed only for an hour or so at each meal, the above ratio of fifteen thousand feet of coal gas to a ton of hard coal does not at all represent the relative advantages of the two. According to President Prichard, of the New England Association of Gas Engineers, in his last annual address, if one must kindle a fire to boil two quarts of water, it

will require not less than five pounds of coal from beginning to end of the operation. If coal were $6 a ton this would cost 11½ cents, while two feet of gas, worth only three-tenths of a cent, when gas is $1.50 a thousand feet, "would do the work much quicker and with less labor expended." Between these extremes are a very large part of the operations of the ordinary household, where gas at $1, or even $1.50, is cheaper than hard or soft coal at $6 a ton. The writer knows of a family of three who live well, having every variety of food, and yet where the average consumption of gas for all cooking does not exceed 1,500 feet a month. This, if gas were $1.50, would not exceed $2.25 a month, and if gas were $1 would not exceed $1.50 a month. In view of these facts and of the vast advantage possessed by gas over coal in cleanliness and ease of using, the former is sure to grow fast in popular favor. The importance of reducing the price, therefore, and of favoring city ownership, if that will render cheapness possible, as the foregoing tables indicate, becomes at once apparent.

Water Gas.

In view of the extensive use of water gas in Philadelphia, which the city buys of a private company for 37 cents a thousand feet and mixes with its coal gas, and further because of the desire of the superintendent of the Richmond gas works, and of some of the Hamilton trustees, to have the city build and operate a small water gas plant in connection with the coal gas works, it is well to say a word on the subject of water gas. It differs from coal gas in being made chiefly from crude petroleum or naph-

tha instead of coal. Coke is used for heat during the manufacture. No residuals are produced. Authorities differ so widely as to the relative merits of the two gases that the writer will not take a decided stand on the question, though forced to confess that the arguments for water gas, when properly made by the later processes, and under some conditions, seem well taken. It is, if I am not mistaken, agreed that where coke and oil are cheap and gas coal high, water gas is cheaper. When the coke of a coal gas plant cannot be sold at good prices it can be utilized in a water gas plant if such be connected with the former. Also, this gas can be quickly made on two or three hours notice, while coal gas cannot be cheaply made unless the retorts are kept in operation all of the time. Therefore water gas has advantages for occasions of emergency, or when the holder capacity is small. Also fewer employees are required, and a candle power of 22 to 26 can be easily secured, while it is quite expensive to raise the candle power of coal gas above 18 or 19.

On the other hand many believe water gas to be more dangerous or to give more trouble in manufacturing and using than coal gas. Dr. Henry Morton, President of the Stevens Institute, Hoboken, N. J., and a famous scientist, denies this, at least as applied to properly made water gas. In a report to an investigating committee of the Philadelphia city council, published in the Philadelphia *Ledger* and other papers, March 5, 1891, President Morton holds that where there is poor gas in any part of Philadelphia it is due to a deficiency of pressure on account of its small mains, or due to an obstruction of the burner. He declares the water gas to be excel-

lent in every respect. After stating that he has repeatedly analyzed similar gas, he says:

"It is of course perfectly true that if this gas, as it passes from the pipe, is inhaled in sufficient quantities, in place of being burned, it will have fatal effects; but exactly the same thing is true of coal gas. It is also possible, although this has never been proved, that a less amount of water gas than of coal gas will prove fatal; but, if this difference exists, its small amount or degree renders it of no practical importance. . . . . .

"The statements about making illuminating gas at five and ten cents a thousand cubic feet are founded solely on the dreams of crazy 'inventors,' and are as scientifically impossible as the world-old fallacy of 'perpetual motion.'

"In conclusion I may mention that water gas has been successfully manufactured and supplied in this place [Hoboken] for the last five years, during which time I have used it in my own house and laboratory, and have found it superior to the coal gas formerly supplied, though its candle power is not so high as that of the gas measured yesterday."

An elaborate article in defense of water gas, by Mr. Frederick H. Shelton, read before the Ohio Gas Light Association in March and published April 15, 1891, in the *Progressive Age*, deserves reading by all interested in the subject.

In a petition to the last Congress to reduce the tariff on coal tar, because of the decrease in the product, due to the diminution in the manufacture of coal gas, the figures of Table XV were given, compiled from "Brown's Directory of American Gas Companies" for 1889. In quoting this the totals for each city are given without the details for each gas company. The cities taken are twenty-one of the twenty-five having more than 130,000 inhabitants.

Thus a little more water gas than coal gas was used in these twenty-one cities in 1889, if this memorial to Congress contained the correct figures. That

TABLE XV.

Name of City.	Total Product. Feet.	Feet of Water Gas.	Feet of Coal Gas.
New York	8,680,000,000	4,460,000,000	4,220,000,000
Chicago	3,250,000,000	3,250,000,000	.....
Philadelphia	3,275,000,000	935,000,000	2,340,000,000
Brooklyn	2,350,000,000	1,365,000,000	985,000,000
St. Louis	1,080,000,000	60,000,000	1,020,000,000
Boston	1,887,000,000	113,000,000	1,774,000,000
Baltimore	1,200,000,000	1,200,000,000	.....
Cincinnati	1,000,000,000	.....	1,000,000,000
Cleveland	400,000,000	.....	400,000,000
Buffalo	410,000,000	.....	410,000,000
New Orleans	191,000,000	175,000,000	16,000,000
Washington	730,000,000	700,000,000	30,000,000
Detroit	245,000,000	.....	245,000,000
Milwaukee	320,000,000	320,000,000	.....
Newark	360,000,000	.....	360,000,000
Minneapolis	250,000,000	250,000 000	.....
Jersey City	290,000,000	290,000,000	.....
Louisville	240,000,000	240,000,000	.....
St. Paul	190,000,000	190,000,000	.....
Kansas City	225,000,000	225,000,000	.....
Providence	458,000,000	200,000,000	258,000,000
Total	27,031,000,000	13,973,000,000	13,058,000,000

they were substantially correct is probable. The relative merits and prospects of coal and water gas have, of course, no direct bearing on the wisdom of city ownership. It is as easy for a municipality to produce gas, if desired, by either method as it is for a private company so to do. But, in view of the interest generally manifested in the subject, the above statements are thought deserving of insertion.

Does Public Ownership Increase Political Corruption?

We next consider the supposed crucial point in the management of gas works by cities, the possibilities of political corruption, that is, the possibility of a

large number of positions being held as spoils for the victorious party. The probability of such a result has been denied by many political philosophers who urge that to gradually increase the functions of government through assumption by public bodies of natural monopolies will diminish corruption. They hold that it will do this, in the first place, by causing people to see that in business requiring some technical skill it will not do to change the officers every time a new party comes into power, and in the second place by leading every one to recognize that it will not be entirely safe to let any party entrench itself in power by control over all the new officials that the assumption of such functions as the management of gas works, telegraphs, electric lights, etc., might involve. It is urged by those favoring city ownership that the present corruption of city councils by those possessed of or desiring franchises far exceeds any probable corruption under city ownership. In the investigation of these nine cities, therefore, this point was kept carefully in mind.

It was found that in the nine cities under consideration the general character of the citizens and of the individuals composing the government was probably no better nor worse than in the average American city. Most of the cities are in sections of country, however, where the so-called spoils system of politics still maintains its sway. If, then, amid such environment any steps toward civil service reform or the divorce of gas officials from politics has been achieved, still better things can be confidently expected in much of New England and other sections where the spoils system has already been relegated to a back seat. The ex-

tent to which the gas works have been divorced from politics in the nine cities is surprising.

Experience of Philadelphia.

The Philadelphia gas works, constructed in 1835, and owned by the city since 1841, were, until April 4, 1887, in charge, not of a superintendent or board responsible to the mayor and voters, but of a board of trustees entirely independent of all investigation or control by the people or city councils. This famous gas trust, first appointed to hold office until a certain portion of the debt was paid, as it finally has been, long brought undeserved discredit upon city ownership by the way it mismanaged the works and used the offices under it as rewards for party service. No defence can be made of their conduct, but the blame must be assigned to its true cause, the irresponsible character of the board. No such board would now be tolerated in any American city. No such board has ever, to my knowledge, controlled any other gas or water works in this country or Europe. An interesting account of this trust and its overthrow has been prepared by another for insertion as Appendix A, in this monograph.

Early in 1887, when real city management began under Mayor Fitler and Superintendent Wagner of the gas works, appointed by the mayor to serve during his four years term, all this political corruption was forced into a rapid and continuous decline. A genuine non-partisan civil service, at least in the gas department, was secured. Mr. Wagner was able to say in his report for 1890:

"By a strict and impartial adherance to the law prohibiting appointments, except after the fitness of the applicant for the place

to be filled shall have been ascertained by a systematic, open and competitive examination, the new appointees are all well qualified for their work, and those heretofore appointed, without such competitive examination, are stimulated to more intelligent service. The results are apparent and of a gratifying character.

"As a correction of the popular notion that the public service is an uncertain one, it may be interesting to add that, even with the appointments and removals entirely at the will and pleasure of the appointing power previous to 1887, there are now many men on our rolls who have been in the city's employ fifteen, twenty and thirty years, and one, in the bureau of gas, since 1835, when the gas works began operation."

In four years of true city control the cost of gas, independent of interest and taxes, but including all improvements, has fallen from $1.17 to 84 cents per thousand feet. The number of employees has fallen from 2,257 to 1,546. The profits to the city in 1890 were $853,092.88, and 551,459,572 feet of gas furnished free to the city and worth, at $1.20 per thousand feet, $660,000, or a total of $1,513,000. It will be remembered that, on a previous page, $1.20 was shown to be the average price paid by New York for public lighting. If the city sold to private citizens for $1.25, even if it had as a consequence no increase of consumption, the net revenue, counting the public lights as above, would be $936,560, or 12½ per cent. on the cost of duplicating the plant, reckoned at $7,500,000. The debt on this plant after deduction of the accumulated sinking fund is only about $1,300,000 at 6 per cent. interest.

Although the new mayor, Mr. Stuart, has replaced Superintendent Wagner by another capable man, Mr. James H. Windrim, there were no charges of corruption or mismanagement against the former. The change appears to be due, not at all to political reasons, but to some unfortunate traits of temper and

lack of tact on Mr. Wagner's part. The Philadelphia *Evening Bulletin*, in its editorial of April 3, 1891, gives the worst that can be said:

"That we have not made a more positive advance in the improvement of our public works has been not because of the shortcomings of the administration, but because of the failure of the parsimonious councils to view the city's needs from an enlightened and liberal standpoint. If Director Wagner had been more careful of his temper and less reckless in inviting unnecessary enmities, this fact would have been generally recognized to-day, and he would have escaped a cloud of popular odium. As we have had occasion to say before in some detail, the official direction of this great department has been marked by economy, industry and fidelity to the public interests."

New York Under Private Ownership.

Let us see whether New York, under private ownership, fared any better prior to 1887 than did Philadelphia under the admittedly corrupt gas trust. For the determination of this very important question we have the best of authority in the report of an investigating committee of the New York senate, made March 31, 1885, and known as "Senate Document No. 41." This report, which gives startling revelations of the stock watering and enormous profits, together with valuable information on the cost of gas making, contains so much that the private gas companies do not want the public to know that, according to the belief of many, they bought and burned all the copies on the market, and hushed up the report most speedily. Certain it is that it has been found impossible, even by some gas engineers, to secure a copy. The report is thus so rare, and at the same time so important, that very liberal extracts, obtained from the copy in the Congressional Library, will be given.

Let us first see which city has furnished gas the cheaper since 1845, New York, with private gas works and a larger population, and far less extended area, with consequent larger possibilities of cheap gas than the Quaker City, or Philadelphia, under the worst form of public ownership.

TABLE XVI.

Time.	Price in New York.	Price in Philadelphia.	Time.	Price in New York.	Price in Philadelphia.
1845	$7.00	$3.00	1869	$2 75	$2.55
1846	"	2.80 & 2.50	1870	"	2.55 & 2.30
1847	"	2.50	1871	"	2.30
1848	"	2.25	1872	"	"
1849	6, 5, 4	"	1873	Not given.	"
1850	3.50	"	1874	"	"
1851	"	"	1875	"	"
1852	3.00	2.00	1876	2 50	2.30 & 2.15
1853	"	"	1877	"	2.15
1854	"	"	1878	"	"
1855	"	2.00 & 2.25	1879	2.50 & 2.75	"
1856	2.50	2.25	1880	2.25	2.00
1857	"	"	1881	"	"
1858	"	"	1882	"	2.00 & 1.90
1859	"	"	1883	"	1.90
1860	"	"	1884	"	1.90 & 1.70
1861	"	"	1885	1 75	1.70 & 1.60
1862	"	"	1886	1.25*	1.60
1863	"	"	1887	"	1.60 & 1.50
1864	3.00 & 2.75	2.50	1888	"	1.50
1865	2.75	3.00	1889	"	"
1866	"	"	1890	"	"
1867	"	"			
1868	"	3, 2.40 & 2.55			

*Price reduced to $1.25 by State law in May, 1886.

Table XVI shows that, excepting in 1865, 1867, and possibly 1873-5 inclusive, or six years out of forty-one years, between 1845 and 1886, the price in Philadelphia has been below that in New York. It might still be were it not for a law passed in 1886 in New York state, reducing the price to $1.25 in cities of over a million inhabitants. Brooklyn having just

reached a million, gas was there reduced in May, 1891 from $1.50 to $1.25 by virtue of the law.

The only reason the price in Philadelphia is kept at $1.50 is, as before remarked, to raise a city revenue of over one and a half million dollars. This is very different from the charge of $1.50 by a private company, where the profit would all go to a few individuals. It should be said that during these years prior to 1886 the Philadelphia gas works, despite the waste and the low price of gas as compared with New York, were entirely freed from debt and somewhat improved in plant from time to time, though not as fast as under the wiser management since 1887. The report of the New York senate committee states:

"The president of one of the New York companies, R. N. C. Graham, testified that in his opinion fifteen millions of dollars would be a fair estimated capitalization to produce an annual output of five thousand million cubic feet—the equivalent of three dollars capital to each thousand cubic feet on such a large output. The fact, as exhibited by recognized publications, appears to be that the average capital per thousand feet of gas in Great Britain is about $3.25; in the city of London about $3.00; in France about $2.00; in this country it is not known to exceed about $5.00;" [probably a considerable under-estimate of the nominal, though not of the rightful, capitalization.] "but by the imposition of this consolidation it would appear to be at the rate of about $8.75 per thousand feet. This unreasonable result could not have been reached without the introduction of illegitimate items, the character of which has already been indicated."

The dividends on the stock of the various New York companies from 1875 to 1885 was in nearly all cases from 8 to 35 per cent. The average net income of the Manhattan company for the ten years was 82.1 cents per thousand cubic feet, besides $1,626,247 for construction and repairs. In the Metropolitan company the profits were 85 cents, besides $564,080

for construction, etc. The net income of another company, the Municipal, for the six years of its existence, was $1.03 per thousand feet, and $235,308 for construction, etc. The Mutual had a net profit of $1.08, "and has carried to profit and loss account $2,809,327 and has also expended in repairs $616,341."

The magnitude of this can be clearly seen by allowing $3 per thousand feet as sufficient capitalization (it has been found to be under that in Philadelphia), and allowing 8 per cent. net income after construction, etc. This income would amount to 24 cents per thousand feet instead of from 75 cents to $1.10 in addition to suspiciously large sums for construction, repairs, and profit and loss. Query: Did any of the latter include a "rubber account" such as the boodle spent by one railroad in bribing legislators was once charged to on the books?

The report continues:

"*It appears that during the last ten years, in addition to costs of gas and ten per cent. on the share or nominal capital of the companies named, there has been paid by the consumers of the city of New York about nine millions of dollars* ($9,000,000.)

"If these ten per cent. annual dividends should be calculated upon the capital *actually paid in* by the stockholders, it would appear that *the gas consumers in ten years have not only contributed such dividend, but a further amount sufficient in fact to nearly duplicate the present system of gas supply. Four millions nine hundred and forty-one thousand dollars have been paid in dividends in excess of ten per cent. on the nominal capital in ten years, nevertheless the plant and works have been increased at the same time out of other earnings sufficient to meet the demands of increasing business, viz., to the extent of* $6,413,000. In 1883 the average cost of gas to all the companies was sixty cents in the holder, while for the same time the average price charged the consumer was $2.16 per thousand cubic feet. To the cost in the holder must be added the necessary cost of distribution."

The italics are the committee's.

On the basis of Philadelphia the cost of extensions and distribution could not have exceeded forty cents. In 1890 the cost of distribution in Philadelphia, it will be remembered, was only eighteen cents, and of construction only fourteen cents. The profits in New York were further shown by the following:

"The gross sum paid for ten years past by the gas consumers in the city of New York to the companies, irrespective of any other source of income to them, is $74,656,884.67. Of this amount nearly half was clear profit, viz.: $30,074,715.27. That the price of gas and the dividends have been too high, admits of no contradiction, and upon any fair estimate a considerable part of the last-named sum should have gone to reduce the price of gas."

This valuable report, which details the stock watering and interesting history of each gas company in turn, gives also a critical study of the cost of manufacture in 1883. Of course the cost everywhere has been much reduced by improvements since then, but the tables remain of sufficient importance to deserve quotation. They are a good illustration of the profits of private ownership of a natural monopoly. The committee, after an examination of the books of each gas company and the procurement of expert testimony on the cost of manufacture at that time in New York state, report:

"It appears that, during the last ten years, gas has been delivered to consumers by one company in the city of New York at an average price during the ten years of $2.29, and at a net average profit during the same period of $1.19, thus showing a net average income from gas per thousand feet of $1.08. It is a noteworthy fact that during the same period this company (the Mutual) should have paid the dividends above quoted [an average of 8¾ per cent.] amounting in all to $3,487,500—an excess of the share capital—and also should have accumulated a surplus represented by profit and loss account of $2,809,327."

Tables XVII and XVIII summarize the business of all the companies for 1883:

TABLE XVII.

Name of Company.	Feet of gas made in holder.	Leakage and unaccounted for gas.	Cost of manufacturing per M in holder.	Cost of manufacturing per M in burner.	Cost of distribution.	Total cost per M.
Mutual	711,677,200	13.5%	45.4¢	52.5¢	39.9¢	92.4¢
Manhattan	1,385,645,000	16.3	55.0	65.7	38.2	103.9
Municipal	793,867,000	10.4	48.0	53.7	33.5	87.1
Knickerbocker	152,192,600	19.8	67.3	83.9	....	....
Metropolitan	893,266,000	13.7	54.7	63.4	33.0	96.5
New York	851,121,000	15.6	45.2	53.6	44.4	98.0
Harlem	367,222,000	25.5	58.4	78.5	40.2	118.7
Total	5,154,990,800	Av. 15.2	51.6	64.5	39.95	100.76

TABLE XVIII.

Name of Company.	Receipts from consumers per M.	Gross profit.	Repairs and depreciation written off.	Net income from gas.	Net income from gas and all other sources.	Dividends per M.	Capital per M sold.	Per cent. of profits on capital.
Mutual	$2.22	130.1¢	10.4¢	119.7¢	120.6¢	56.9¢	$10.95	21.2%
Manhattan	2.18	114.5	14.1	100.5	100.9	86.2	4.40	29.3
Municipal	2.31	144.2	6.5	137.7	138.4	84.3	7.77	32.8
Knickerbocker	2.39	.....	9.3	....	.....	....	.....	.....
Metropolitan	2.11	114.3	11.5	102.9	104.5	64.9	7.47	32.2
New York	2.04	106.2	49.7	56.6	57.7	55.7	6.10	10.4
Harlem	1.68	49.1	4.1	45.0	45.0	39.5	7.59	6.8
Average	2.17	115.9	16.9	98.935	99.8	67.7	....	....

Evidently the profits in most of the companies as given in the committee's tables above was from 40 to 60 per cent. of the real cost of duplicating the

works. The committee also give a summary of the New York gas companies for the years of 1875 to 1884. "The net income from gas per thousand feet," says the report, "has increased during late years, as is illustrated by comparing the net income as shown above for 1883, which was 98.9 cents, with the average for ten years which was 86 per cent." Surely Philadelphia citizens were no worse cheated even by the gas trust than was New York. Not indeed as much, in view of the lower price in Philadelphia.

Before leaving the report it will be well to quote a valuable paragraph on the proper pressure in forcing gas through the mains:

"The testimony has established that the mean pressure of economical consumption is such pressure as would balance a column of water not less or more than six-tenths of an inch in height. If the pressure as it enters into the meter exceeds this mean of economical consumption the result is loss to the consumer. The pressure at the works must necessarily be regulated in accordance with the demand for supply, and it varies with different hours of the day and night. Long experience has enabled the companies to adjust this pressure. Its record is kept at the works, where it is registered automatically. The distance of the source of consumption from the works where the pressure is regulated is another element that causes great variation at the consumer's burners. The United States Superintendent of Gas in Washington reports that 'the cause of large bills is excessive pressure in the street pipes.' Professor Preeco, an English scientist, says: 'An important fact with which every household should be made acquainted is that the quantity of light given in the gas burners depends very much upon the pressure with which it is forced through the jet.' Professor Hosford, of Harvard, says: 'When gas rushes from the burner with high pressure it mixes quickly with the air and is consumed without time being given for the carbon to become luminous.'"

Having thus compared Philadelphia with New York much to the disadvantage of the latter, and having before this seen that, since the assumption of

control of the gas works in the former city in 1887 by men subject to the mayor and the people, there are no charges of corruption, although rather more men than are necessary are, it is said, still employed, we are ready to take up the other eight cities in turn.

Politics in Richmond.

In Richmond, Va., there is some connection between the gas works and politics, but it is not as great as in many, indeed I think most, cities where the gas works are in private hands. The same man has been superintendent since 1886 and before that was assistant superintendent from 1870 to 1886, and he came to the works in 1865. Richmond has been nominally Democratic for years; yet rival factions have at various times controlled the city without injury to the gas works. In 1886 a workingmen's ticket was elected and no employee was changed. When the regular Democratic party returned to power in 1888 about ten of the one hundred or more employees were discharged for "offensive partisanship." The rest continued at work. Still it is admitted by the city officials that the employees are all supposed to be Democrats. A complete divorce from politics has not therefore been secured, but in a city where most of the people are of one party there is no difficulty in securing good men from that party, and since, when the parties do change, the chiefs in the gas department are retained, little harm results. It is to be hoped, however, that even the few changes in minor offices will in time cease. While the author met many in Richmond who held that minor employees should belong to the ruling party, no one was found to advocate the application of the political

test to the responsible officers of this gas department, who perforce must be specialists, and specialists can not readily be found any day of a desired political faith. It must be remembered that most of the intelligent and ruling class in the South are Democrats.

Only one tendency toward poor management was discovered in Richmond. Rather more men were employed than were necessary, and the city council were said to be a little slow in making improvements in the works, lest some men be thereby discharged. How true this is could not be proven in the short time at my disposal; but every one agreed that the works were entirely free from suspicion of corrupt management. A searching investigation in 1885 by a citizens' committee, induced by complaints of bad gas, revealed no corruption or suspicion of it, but simply a lack of sufficient street mains and other apparatus of manufacture, which was thereupon remedied. The superintendent says that the wages of the common laborer, $2 a day, are above the average in other employments. This failing, if it be a failing, is quite common in public work. Many consider it an advantage for public works thus to set the example of good wages.

The present able mayor of Richmond, Mr. J. Taylor Ellyson, informed the writer in decided terms that from his wide acquaintance with Virginia politics, and he is chairman of the State Democratic Committee, he had become convinced that there was far more corruption and demoralization of politics produced by local monopolies in private hands than when owned by the public, as is the case in four Virginia cities. Mr. Ellyson held, as do many thinkers, that one of the gravest dangers to our institutions

is the corrupt control of our city and state bodies by corporations possessed or seeking to become possessed of public franchises. The solution of the serious problem seems to lie in the assumption of such enterprises as fast as practicable by the public. Whatever may be true of other kinds of business, the supply of gas, water and electric lights has been proven practicable in Virginia wherever tried.

Politics in Alexandria.

How is it in Alexandria? Mr. Roxbury, the superintendent of the gas works, died in April, 1891, after an incumbency of the office for thirty years, excepting two years not long ago. The superintendent is elected by the people every two years, and appoints his own men, but is subject to the council in most respects. Mr. R. T. Cook, secretary of the department, writes: "There are not many changes made when new officers are elected. I think only one in seven or eight years." However backward Alexandria has been in keeping her works abreast of the times, political corruption cannot be charged against her.

Politics in Henderson and Wheeling.

Next in order of time of establishment comes Henderson, Ky., whose history, together with that of the others, will be given a little later. Suffice it now to state that Mr. William Cannings has been superintendent since the city stopped leasing the works, and took active charge of the management in 1882. He has given full satisfaction, and on his own authority and that of citizens of Henderson, it can be

said that politics have had nothing to do with the management of the works.

Nearly as much can be said of Wheeling. One who has been intimately acquainted with the gas department in Wheeling writes as follows:

"At the time the city took possession of the works (1870) Mr. Arthur Brown was superintendent, and he continued to be so for about six years, when he and the secretary, Mr. King, were caught doing considerable crooked work, and were arrested and punished for it. The rules and regulations, etc., were then changed, as well as the entire system of keeping accounts. At this time the council, as well as the board of gas trustees, were Democrats, but they elected as superintendent of works, Mr. J. M. Dillon, a bitter partizan on the other side. Mr. Dillon, I believe, was then superintendent about six years. Then Mr. S. M. Darrah was elected by the trustees and held for two years, when Mr. Dillon was again elected and held for two years. Then the present board again elected Mr. Darrah, who holds the position now. So far as politics making any difference in the management of the works, there is nothing in it. So far in the history of our works there has never been a superintendent who has not been a competent man.

"There are, of course, many changes made among the stokers, chargers, laborers, etc., around the works. But there has never been a time when all of the employès have been of one political complexion. It is seldom you hear the gas works mentioned at the election. The bill by the state legislature, granting the city the right to sell gas, compels the board to be of two political parties."

Despite this statement I believe that the frequent alternation of superintendents indicates the strife of parties. The fact, however, that the alternation is always between the same two men, who are recognized as competent for the place, indicates that whatever political interference there may be is kept within bounds. The present superintendent, Mr. Darrah, remarked, if I understood aright, that political considerations may sometimes affect the position of employees, and that, if this were stopped, the works would show still better results. But the superintendent strikingly confirmed the faith of many economists when he said that the very fact of the

gas works being in public hands is forcing the question of civil service reform to the front.

Politics in Bellefontaine, Danville, Charlottesville and Hamilton.

Bellefontaine is free from the spoils system in her gas department, as the following letter from her corporation clerk, Mr. S. L. Smith, states:

"The three trustees of the city gas works are usually Republicans, as our town has been Republican ever since there was any Republican party. At least so I am informed. No political requirement is made in hiring assistants at the works. I have never heard any charge of corruption in connection with the works. Have made inquiries and cannot find that any such charge has ever been made. Never had any private gas works here. The superintendent has held his position for many years. The works have always been well managed, but are now insufficient to supply the demand for light. We talk of putting in electric lights."

In Danville and Charlottesville it can certainly be said that politics have nothing to do with the works. Captain C. A. Ballou has been city engineer and superintendent of the gas works in Danville for sixteen years. Superintendent T. J. Williams has been in charge in Charlottesville since 1855. Hamilton starts out with a similar laudable purpose of keeping the gas department out of politics. The present trustees and superintendent are Democrats and the assistant superintendent and the foreman of the service gang are Republicans. Mr. R. Allstatter, superintendent of the Hamilton works, writes:

"In regard to your question, 'Must employees of city gas works belong to the party, or is it so expected?' I will answer no, as long as the present board of trustees are in power, qualification for the position is what we expect. As to whether the old private company used corrupt means, I will say that the general belief was that money and misstatements were used by them to gain their point with councils."

Summary.

We therefore find that six of the nine cities are entirely free from political influence, and that two others, Philadelphia and Richmond, can only be charged with employing a few more men than necessary, for the sake, possibly, of giving employment to political friends, though this is charged, not proven. In Wheeling we find conflicting accounts, but do know that the financial results are fine, and that whatever connection the works may have with politics does not produce much injury, and is diminishing.

History of City Ownership.

Before giving any detailed account of the history of gas ownership by municipalities in this country, a word may be given about the general history of gas as an illuminant. According to the best authorities, gas was first used as a regular means of lighting in the Soho engine works at Birmingham, England, in 1798, by William Murdoch, who devised practical methods of manufacture. It was first employed for street lighting in 1807 in a small section of London. Not until 1816, however, did gas gain much headway in London. Thence it rapidly spread. Success in gas making in this country was first attained on any large scale in 1821 at Baltimore, in 1822 at Boston, and in 1827 at New York. For a long time most gas companies made their gas from bituminous coal, as fully two-thirds still do in the United States and nearly all in England, though the New York companies used oil and resin. The first patent for water gas was granted in London in 1824, but only within the last

ten years has it come into extensive use. "Brown's Directory of American Gas Companies" for 1890 shows that now there are about 1050 gas companies in the United States with an aggregate capital of over $600,000,000.

Richmond, Va.

Richmond, Va., with a present population of 81,000, which is steadily growing, and with an appearance of thrift and substantial business prosperity quite in contrast with its condition twenty-five years ago, began ownership of its gas works in 1852. The war, of course, sadly upset things, but the city kept its property and now has a plant more than paid for out of its net earnings. As has been stated, coal gas is used exclusively here, as in all the nine cities, save Philadelphia, where about one part water gas is mixed in the holders with two parts coal gas. As the detailed figures for Richmond, like those for the other cities investigated, appear in the tables to be found on previous pages, it will be necessary here merely to call attention to some of the salient features. With gas coal at $3.35 per ton, or 34.6 cents per thousand feet of gas in the burner, and coke at $3 a ton, which may be considered an average price for eastern cities outside of New England, Richmond makes and delivers its gas at a net cost of 76.6 cents per thousand feet, exclusive of extensions and of interest and taxes, which it does not have to pay. The cost, including extensions and improvements, was 83.5 cents in 1890. The cost in the holder was about 57 cents, leakage about 6 cents, and other costs of delivery, according to the superintendent, were about 13 cents.

The cost in Richmond in 1882, no allowance being made for interest and taxes, was $1.09½ cents without the extensions and $1.15 with them. This shows that public companies can make improvements as well as private, and this is further evident from the fact that the reduction in price has been largely due to improved works, which have reduced the labor cost from 66.4 cents per thousand feet in the burner in 1882 to 47.2 cents in 1889, without any reduction in the rate of wages. Rather have the wages per man risen, as in the other cities. All these figures, as in the other cities when not otherwise specified, are calculated on the amount of gas in the burner, in order to cover leakage and to apportion all the items of cost on the gas actually consumed. It should be added that the superintendent is trying to secure from the city government permission to erect another gas holder, so as to dispense with the necessity of so large a force of men as now. Owing to lack of storage capacity at present, the works have to be run harder during the hours of 7 to 11 P. M. than at any other time, and at more expense. With the addition of a holder costing about $95,000, and with a capacity of 750,000 feet, or a water gas plant costing about $23,000, and with a capacity per 24 hours of 500,000 feet, Mr. Adams believes the cost could be reduced at least five cents a thousand feet. These improvements have been endorsed by the mayor in his message for 1891. Mr. Ellyson also recommends the erection by the city of an electric light plant.

Water gas being of a higher candle power than coal gas, it should be daily used if at all, otherwise consumers will surely complain and think the gas poor because irregular. It is better to have gas of

18 candle power every day than 18 some days and 22 others, but a water gas plant, to run every evening in connection with coal gas, might be very desirable.

The present manufacturing plant has been largely rebuilt within five years, and appears to be in excellent condition. The consumption of gas has steadily increased, being 60,672,000 feet in 1870, 97,413,100 feet in 1880, 138,197,700 feet in 1884, when the price was reduced from $2.00 to $1.50, with an addition of five per cent. for delay in payment; 153,371,000 feet in 1885, 165,104,500 in 1886, 179,108,600 in 1887, 185,534,500 in 1888, 185,162,200 in 1889 and 196,990,600 in 1890. These figures are the amount made. The amount used is about ten per cent. less, owing to leakage. The introduction of electric lighting in streets and stores prevented any increase in 1889, as in many other cities, but the ratio of increase has now been resumed. From the output of gas during the first seven months of 1890, Superintendent Adams expects that the consumption for 1891 will exceed that of 1890 by 20,000,000 feet. He has rebuilt a good part of his benches where the gas is made and has thoroughly repaired the holder where leakage in 1890 kept up the cost of gas somewhat. It is already evident that the cost in 1891 will be 5 to 10 cents less per thousand feet than ever before.

A very important question to be settled is the actual value of the gas plant. Unless we know this, we cannot know how much to allow for interest and taxes, in getting the entire cost of gas manufacture. It was soon discovered, as previously explained, that the off-hand statements of officials, made possibly with a natural desire to magnify the size of the business under their control, were great exaggera-

tions. Yet these same statements have been made the basis of such criticisms of the gas management as to become a serious matter. The superintendent of the gas works says that, according to the vouchers, the entire cost of the works has been about $800,000; but much of the plant was built when prices were higher than now, and much has been replaced by later improvements. Even assuming that a new system would duplicate all the mains laid since the commencement of the works, the entire cost of such a plant, at ruling prices for labor and material, was figured out by Mr. Adams and myself at $592,795, or, say, $600,000. The cost per pound of pipe and per foot of laying of the various sizes of the sixty-five miles of mains, was considered. The items of the entire cost were as follows:

Mains	$226,945
Meters and services (6,493) @ $20	129,850
Land	11,000
Holders (3) of 700,000 ft. capacity	110,000
Rest of manufacturing plant	115,000
Total	$592,795

The city can now borrow at four per cent., but most of its debt is drawing five and six per cent. The tax rate is $19 on a thousand. Allowing the liberal rate of six per cent. interest, the amount of interest and taxes would be 7.9 per cent. on $600,000, or $47,400. This, divided among the 173,343,500 feet consumed in 1890, gives 27.3 cents per thousand feet. The total cost in 1890 was, therefore, 76.5 cents for making, 27.3 cents for interest and taxes, 6.9 cents for extensions and permanent improvements, or $1.11 in all. The cost for 1889 was about $1.18, because of greater extensions and improvements. The city, by

charging $1.50 and paying no interest nor taxes, earns a profit of 19.5 per cent. in addition to improvements and extensions, and would have a clear net profit of 11.5 per cent., even if it were paying 8 per cent. as interest and taxes.

The net profit in money above the improvements was $100,000 in 1889, being evidently the difference between $1.50, the selling price, and 89.2 cents, the cost of the gas in the burner. The net cash receipts were $34,639.44. The value of 43,135,687 feet of gas at $1.50, consumed by the city, was $64,703.53, and there were $1,598.81 of delinquent gas bills, making a total of $100,941.78. Similarly, the profits in 1890, after deducting improvements and estimating the gas used by the city at $1.50, were $115,000. If the gas used by the city were reckoned at $1.11, the cost of making, including interest and taxes, the net profit would be $98,000, or over 16 per cent. on the cost of duplication. As these figures absolutely contradict those of the report of the Massachusetts committee of investigation of April, 1890, which showed an apparent loss to the city of $42,405.97, a little study of the report of this committee will be instructive. This report is the one elsewhere referred to as by the committee which, according to Superintendent Adams, of Richmond, took along Mr. Greenough, the gas engineer of the Boston Gas Light Company, as chief investigator. The report on its face tends to confirm the charge that it was written in the interest of this Boston company, which was then fighting the bill in the legislature permitting cities to own their gas works. Now for the facts.

The Massachusetts committee figure out $33,065.99 as the excess of cash receipts over expenditures, but

include in expenses not only all the extensions and permanent improvements, which enhance the value of the plant and cheapen production, but also include $3,172.26 expended in the work of lighting and caring for the public lights in the streets, which is no part of the legitimate expense of gas making any more than is the care of public parks. Making allowance for this last item, and permitting the other to stand, the net cash balance becomes $36,238.21. The reason for the slight difference here between the committee's figures and mine just quoted, is that the committee use the report of the superintendent, made up on January 1, and I prefer to use that of the auditor, made up a month later, and likely to be more accurate.

The next mistake of the committee is in crediting the city with the gas used in the streets and public buildings at its alleged cost, 87 cents, exclusive of three cents alleged permanent improvements, instead of the price which it would cost the city if it bought of a private monopoly. Some may contend that the city might get its gas cheaper than $1.50 for public use if it bought of a private monopoly, though the price to private citizens might still be $1.50. Although this may be true, it would only be because a private company might offer to pay for the purchase in this way, as in Nashville, where the city buys for $1.05 and private consumers for $2.10, yet it would evidently be clearer and better book-keeping to consider the price to the public the same as to others, and to obtain from any private company a money payment.

But suppose we agree with the Massachusetts committee and take for the price of the gas used by the

city the real cost of making. This cost, however, is more than 87 cents, if we consider interest and taxes to be a part of the cost, as the committee insist upon doing. If so, the cost, as stated above, was $1.18 in 1889. At this figure, which is certainly more accurate than 87 cents on the committee's own showing, the value of the 43,135,687 feet of gas used by the city would be $50,770. Adding this to the net cash balance, we have a clear profit to the city of $87,008.69. Against this, according to the committee, we should place 6 per cent. interest and 1.4 per cent. taxes on the $1,500,000 said to be the value of the works. But the real cost of duplicating the works in their present state of efficiency is only $600,000, as has been shown. Now, 7.4 per cent. on that is only $44,400. This deducted from the profit of $87,008.69 leaves a net profit of $42,608.69, or 7.1 per cent. over and above 1.4 per cent. taxes and 6 per cent. interest on a plant that is paid for, or 14.5 per cent. in all, while, besides this, the city gets its gas at cost.

The net cash revenue in 1890 was $49,212.58, after paying for all extensions and improvements. The city also used on the streets and in public buildings 44,599,400 feet, worth from $44,599 to $66,899, according as we estimate the gas at $1.00 or $1.50 per thousand feet. Mayor Ellyson, in his report for 1890, given in February, 1891, says:

"The time has come for a reduction in the price of gas. The prompt introduction of improved methods of manufacture, which can be secured at an outlay of not more than $25,000, will enable us to furnish gas at $1.25 per thousand feet, and even at a lower rate still to large customers, and yet obtain more net revenue than we now enjoy. I repeat with renewed confidence my previously expressed conviction in the wisdom of municipal control of our gas works. A private monopoly is more to be dreaded than municipal control [ownership is meant], and private competition does not

always bring cheaper gas. Private corporations may sometimes, for a season, furnish light at a lower price than would the city, yet the invariable result of unprofitable competition is the combination or consolidation of rival interests in favor of higher prices."

Even without improvements and without the increased consumption sure to follow a reduction in price, Richmond could sell gas at $1.25 and clear, on the basis of 1890, $67,876, or 11 per cent. on the value of the plant. Let other cities with an equally poor market for coal, coke and tar ponder these facts well.[1]

Alexandria.

There is little to be said about Alexandria which has not already been given when commenting on the tables of cost and on the relation of public works to politics in the nine cities. A small city six miles south of Washington, with a very large percentage of colored citizens, and apparently unprogressive in many ways, Alexandria has not kept up her gas works as she ought. The report ("House Document No. 434") of the Massachusetts legislature in April, 1891, puts the matter correctly when it says, "No comparison could fairly be made, even in the manufacture of gas, between a growing, prosperous New England community and the old city of Alexandria, which, it is to be regretted, appears to be rapidly falling into decay."

The cost of making gas is 94.7 cents without allowance for interest and taxes, the works having to bear neither, and $1.58 with such allowance. This, however, will be much reduced by the improvements soon to be made. Despite the evident

[1] Since the above was written the city council has agreed to reduce the price after 1891 to $1.25.

mistakes of the city management, the people, I was assured, have been so bled by the private company which own the water works that the gas works would not be abandoned by the city under any consideration. In 1853 the city bought the works of a private company which had agreed to build them and to turn them over to the city if they proved satisfactory, as they did.

Henderson, Ky.

Henderson, Ky., a flourishing city on the Ohio, nearly opposite Evansville, with a present population of 8,830, and a great center for the tobacco interest of that part of Kentucky, has had much success with city ownership. On the occasion of my visit in September, 1890, every one of the many citizens with whom I casually talked expressed great satisfaction with city ownership, and said that no suspicion of political or other corruption or inefficient management exists. The importance of a personal visit was here most emphatically emphasized, as it had been found impossible to get any reply to repeated letters of inquiry. Many gas superintendents do not appreciate the importance to the whole country of their work, and being busy men with no great gift for letter writing they, as is perhaps natural, throw many letters of inquiry into the waste basket. Unpaid for correspondence becomes a serious burden in these nine cities, for hundreds of people are now writing them yearly for information on the results of city ownership.

Henderson, though a small place, now makes good coal gas and delivers it at a cost of 74.6 cents exclusive of interest and taxes, but inclusive of the ordi-

nary improvements and extensions of the works. There was also an expense of $1,300, or 15 cents per thousand, however, in rebuilding on the grounds the house of the superintendent, which house is furnished as a part of his salary. A great improvement in the works was made in 1888 and 1889, amounting to 26 cents per thousand in the former year and 27 cents in the latter. Few permanent improvements will now be needed for some time. The inclusion of interest at 6 per cent. and taxes at 2 per cent. on the value of the plant, and the thirteen cents for permanent improvements, would raise the cost to only $1.36. Of course no interest nor taxes are paid. The works are out of debt and no city-owned works are taxed.

The gas works were erected by a private company in 1859, but gave such poor satisfaction and entailed such losses on the owners, largely in consequence of the war, that they were gladly sold to the city January 22, 1866, for $2,330.17, being simply the amount of indebtedness contracted by the company for improvements. The works were leased to one who made what he could and then disappeared. They were released to another party for fifteen years. On the expiration in 1882 of this lease, which was found very disadvantageous to the city, the latter wisely decided to operate the works itself. The plant, which was then in poor condition, has since been thoroughly renewed and gives every appearance of being in good shape. The superintendent, Mr. William Cannings, has served in that capacity since the city assumed control in 1882, and politics play no part in the management of the works. The following letter from the city clerk, Mr. F. W. Reutlinger, written March 27, 1891, in answer to questions of

mine, furnishes interesting and valuable information:

"To Mr. Cannings is due, to a great extent, the remarkable success of our little gas plant. Vigilant and devoted to his business, he succeeded where others failed, and now he can proudly defy those narrow-minded big heads of councilmen, who tried to lease out the works at the time of his election, at ruinous terms. Citizens came to the rescue of the sober headed councilmen and forced the sore-heads into submission. William Cannings ought to have a place in your paper. Honor to whom honor is due. The city never issued any bonds for the works, and does not now owe anything on them. When the fifteen years lease was made the city remodeled and enlarged the dilapidated works considerably, spending about fifteen thousand dollars in permanent improvements, including extension of mains.

"The consumption of gas in 1890 was only 34,200 cubic feet increase over 1889, owing to agitation for electric plant to be owned and operated by the city, on which latter point citizens are almost unanimous.. Many good consumers went so far as to have gas turned off and to burn coal oil as an incentive for the council to procure an electric plant. The council (knowing the experience of other cities) left the question to a plebescite 'for or against electric light.' Electric light was defeated February 9, 1891, the citizens preferring macadamized streets first (on which we spent $20,000 last year and will spend as much this year), and then electric lights. The question, moreover, was, Will the gas works with a sure revenue be sustained, or the electric light, at a cost of $40,000 or $50,000; can both live? Will one go under or both? After the election the council wisely concluded to reduce the price of gas from $1.50 to $1.25, to take effect February 1, 1891. Consumers are returning now, and we expect no reduction in profits, as the lower price will induce more consumption, besides the natural increase of the city in new buildings, etc. This is indeed satisfactory. The number of consumers in March, 1890, was 351. In March, 1891, it was 374. Our works will supply double the amount of gas now furnished. The additional expense will be mostly for coal, half or more of which we get back in the use and sale of coke and tar. I venture to say that we have now the lowest price of gas to consumers on the Ohio river where Pittsburg coal is available by river."

From May 1, 1890, to May 1, 1891, the gas works in Henderson, besides paying for improvements in the form of some twelve-inch street mains, showed a

profit, according to estimates of the gas department, made only five weeks before the expiration of the year, of about $4,000 cash and $3,300 in the value of the gas used by the city, or a total of $7,300. This amounts to 73 cents profit on every thousand feet of gas in the burner, and to 12 per cent. profit on the value of the plant. The city can evidently well afford the reduction to $1.25, made in February. It would still clear 8 per cent. profit. To be sure, gas coal in Henderson is only $2.38 per long ton, but coke is only 5 cents a bushel, tar 4½ cents a gallon, and the population is only 9,000. That, under these circumstances, gas can be sold at a profit for $1.25, speaks well for city ownership.

Wheeling, W. Va.

Wheeling, W. Va., is the most conspicuous example of success in city ownership. The price charged, if paid promptly, is only 75 cents. When the city took possession in 1870 gas was $3.50; this was successively reduced to $2.80, $2.00, $1.80, $1.50, $1.25, $1.00 and 75 cents, while the cost of manufacture in 1889–'90, exclusive of repairs and the lighting of the public lamps, was only 34.3 cents. The cost, with the inclusion of repairs and extensions, was 40.2 cents. The inclusion of interest at 6 per cent. and taxes at 2 per cent. would only raise the price to 67 cents. The low cost of coal, $1.58 a ton, or from 15 to 35 cents less than in many cities, partly accounts for the low cost of gas; good management accounts for the rest. The residuals sell for 16 cents per thousand feet of gas burned, the coke sells for the low price of $1.40 a ton, or less than 3 cents a bushel, and the tar for the moderate price of $2.14 a

barrel, while about one cent per thousand feet of gas is received for ammonia. Better prices for residuals are expected next year.

Most cities can do as well as this with residuals, and, apparently, ought to make gas for as many times 10 cents in excess of 67 cents as coal exceeds $1.58 a ton in dollars. If, for example, good gas coal costs $3.00 a ton, then, according to the results reached at Wheeling and Hamilton, O., gas should cost only 85 cents, after allowing 8 per cent. for interest and taxes. If coal sells for $4.00, gas should not exceed 95 cents. Even if we allow a margin of five to ten cents for more extensions and improvements than were needed in Wheeling last year, the cost would still be only 90 cents and $1, with coal $3 and $4 a ton, respectively.

City ownership in Wheeling began in 1870, when $100,000 bonds were issued to buy the works. Until 1879 there were no proper regulations or oversight by the other city officials of the operations and book-keeping of the gas department. As might be expected, in 1879 the superintendent, in conjunction with the secretary, following the practice of employees in private business corporations, misappropriated the funds and burned the books to conceal the fraud. An entire reorganization of the gas department followed, and since then few, if any, serious abuses have occurred.

As elsewhere stated, there is said to be a partial, not a close, connection between the gas department and politics. If Wheeling can do so well with no better methods of appointment than in most places, still better results are to be expected with the growth of the civil service reform idea. The city council

in Wheeling elects three gas trustees, who serve for two years under a joint bond of $15,000 and appoint and discharge the superintendent, secretary and collector, all of whom are under bonds of from $1,000 to $10,000. The trustees appoint employees to serve under the superintendent, on his recommendation. He can appoint to fill temporary vacancies, and can discharge at discretion when an employee is incompetent or not needed. A full printed statement of rules and regulations was given me by the secretary, Mr. A. A. Franzheim.

Wages, says the superintendent, are somewhat higher than in competitive works. Perhaps with this in mind, Mr. Franzheim writes:

"I believe it is true that a private corporation or firm can manufacture gas somewhat cheaper than a municipality, the same as in everything else, yet the difference in the benefit the consumers receive would justify even a greater cost than it perhaps is."

That is usually forgotten. Whether a municipality can manufacture cheaper than a private company or not, may be an open question. The lower interest that a city has to pay, until its works are freed from debt, may be counter-balanced by more expense for wages, which is not an unmixed evil, and in other ways. But, however this may be, the public get, or can get if they choose, more revenue or cheaper gas than when a private company has charge. Wheeling is so well satisfied with the gas management that in May, 1891, the city council voted to appropriate $100,000 for an electric light plant.

Bellefontaine, Ohio.

As the writer has been unable to visit Bellefontaine, O., situated thirty miles north of Springfield,

he cannot give details of the history of gas management. As far as learned, the ownership by the city since 1873 has given general satisfaction.

The following letter from Mr. S. L. Smith, corporation clerk of Bellefontaine, gives important facts. Under date of June 12, 1891, he writes:

"Our city built its own gas works in 1873, issuing bonds for that purpose to the amount of $35,000. Previous to and since that date, we never had any private-owned gas works here. The price of gas has been $1.50 per thousand feet until about two years ago, when it was reduced to $1.00. We have no electric light plant, but there is talk of putting one in. We are now putting in some new mains and making some improvements in the works.

"I believe it is generally conceded that the investment has been a very profitable one and there has never been *any* protest whatever against city ownership."

Danville, Va.

Danville, Va., a rapidly growing city now numbering 10,480, and which boasts of being one of the wealthiest cities in the Union, in proportion to population, is situated 141 miles southwest of Richmond, near the North Carolina border. Full opportunities for investigation into the successful operation of the gas works were given here as in the other cities.

The cost of gas in 1889, exclusive of interest and permanent improvements, was $1.04, but of this sum fifty-four cents was paid for coal, which was $5 a ton, while only two cents per thousand feet of gas sold was obtained for residuals. This was due in part to a very poor market for the latter, and in part, apparently, to the neglect of the officials to make sufficient effort to sell the residuals in other places. The poor quality of some of the old benches, which made the gas, also led to an undue consumption of coke as fuel in the works. Improvements suffi-

ciently remedied this to enable 8.4 cents to be secured for residuals in 1890, while coal was secured for 50.6 cents per thousand, thus reducing the net cost to ninety-eight cents, and further improvements just recommended by the superintendent will, if adopted, secure further reduction. If the cost for coal were fifteen cents less, as is the case in most cities, the net cost would be little over eighty cents. Also 16.5 cents were spent in 1890, and about the same in 1889 for improvements.

The works are now in excellent condition, but the small size of Danville, the cost of coal and the poor market for residuals have hitherto kept the works after furnishing gas to all at $1.50 per thousand feet, from doing more than earn a fair interest and taxes on the investment. The original cost, about $30,000, was in eight per cent. bonds, which do not mature until 1906. The recent improvements, costing $30,000, were made with five per cent. bonds. The works earn enough to pay the interest, and may, with the help of the recent improvements and the steady increase of consumption, pay for the plant as the bonds mature. The net cash received by the city in 1890 was $4,630.21. To this should be added the 581,400 feet of gas used by the city at $1.50, making a total of $5,502.31, or ten per cent. on the value of the works. But of this, $1,778.58 were spent in permanent improvements, reducing the net profits to 6.7 per cent. As similar heavy expenses for permanent improvements will not be required again for some time, the net profits for 1891 will probably equal or exceed ten per cent.

In 1876 the works were bought of a private company, which had built them in 1874 subject to the

right of the city to purchase. According to Captain C. A. Ballou, the city engineer and superintendent of the works, they were badly built and badly operated when in private hands. The gas was irregular in amount and poor in quality. The same company had built the water works, and they were bought by the city at the same time. The price was determined by the valuation of honest and capable experts, but it is stated by one of the city council of that period that the private company gave greatly exaggerated accounts of the extent and quality of their mains, and the cost of raw material fell nearly half within a year, so that the works could have been duplicated in 1877 for much less than was paid for them in 1876. A new gas holder, with an almost complete outfit of manufacturing apparatus and buildings, has been constructed in the last three years, at a cost of about $30,000.

The price of gas has been reduced under city ownership from $4.00 to $1.50. If bills are not paid within five days the price is $2.00. Danville is also doing finely with its city-owned electric light plant. Some of the electric light and nearly all of the gas is sold to private consumers. No charges of corruption, as previously stated, seem to have ever been made. Captain Ballou has been in charge ever since the city began ownership sixteen years ago. Here, then, is another example of honest management of public work without political corruption. No changes on political grounds are made in any of the force when the politics of the city change.

Charlottesville, Va.

Charlottesville, Va., the famous seat of the University of Virginia, 117 miles by rail southwest of

Washington, is a pretty city of over 6,000 inhabitants. Through the courtesy of Mayor S. B. Woods and Superintendent T. J. Williams, full information was given on my visit in December, 1890. In 1855 a private company built the works and ran them until the civil war, and part of the time then, save when the operations of war shut off the supplies of coal. About 1870 another private company bought the works for $11,000 and made large dividends, but allowed the works to deteriorate. In 1876 the city bought the works for $20,000. Many improvements have been made since then, including $7,000 in 1889 for a new holder, so that the works appear to be new throughout, and everything impresses one as in good order.

The price of gas was reduced, when the city took possession, from $3.50 to $3.00, then to $2.25 in 1886 and $1.50 in 1887. The works have yielded a good revenue in cash, and in free gas to the city. The entire cost of making and delivery, exclusive of interest and taxes, is one dollar, owing to the high price of coal—52.8 cents per thousand feet of gas in the burner,—and owing to the small size of the place. The cost, including taxes at two per cent. and interest at six per cent. on the full value of the plant, $35,000, though the debt is only $20,000, is $1.46 per thousand feet.

Said the mayor—

"No charges of corruption have ever been made and the working of the plant has been regarded as satisfactory. Time and again private parties have sought to buy, and have sought to show that it would be to the advantage of the public, but an investigation has always shown the contrary."

The works are entirely independent of politics.

Hamilton, Ohio.

This flourishing city, twenty-five miles north of Cincinnati, became so dissatisfied with the high price, $2, and the inadequate mains of the private company supplying gas, that public works were built and began operation April 28, 1890.

Mr. Robert Alstatter, president of the board of three gas trustees, elected by the people, thus writes under date of May 18, 1891:

"I advocated the ownership of gas and water works by the city more than twenty years ago. At that time I stood almost alone as to the ownership of gas works. After a continued agitation of sixteen to seventeen years, the matter was finally brought to a vote of the people, and resulted in a victory of about six to one in favor of the city owning the works.

"The old company commenced suits at once in different courts, at different times, causing delay and great expense. The city, however, coming out of the suits victorious, the old company finally admitted the right of the city to build and run gas works for public lighting only, and they now have a suit pending in the supreme court of Ohio, claiming that the city has no right to sell gas to private consumers. Depositions have been taken, and I think the city has made its side so strong that they (the old company) are afraid to press the suit, for it was to have come up six months ago.

"The old company is selling gas at 95 cents per thousand feet, but owing to the great pressure ($\frac{7}{10}$) they must carry in order to get the quantity through their small mains, their gas bills run from 25 to 35 per cent. higher than city gas at $1.00, with city day pressure $\frac{4}{10}$, night pressure $\frac{4}{10}$. Or, in other words, city gas is cheaper at $1.00 than the old company gas would be at 62½ cents on the average. The city has large mains, therefore we can keep the pressure low, which makes it more profitable to consumers."

Since the above was written the writer has visited Hamilton and learned the interesting story of city ownership in full. The old gas company of the city, which had been in operation since 1855, was charging $2 for gas that was generally thought poor in quality, when the citizens began to agitate the public ownership in 1888. The private company seemed ready to

sell out to the city but, according to Colonel George H. Phillips, now superintendent of the city works, the price suggested was $300,000 and a board of arbitration of three expert gas engineers was refused by the company.

The city then sent a committee east and engaged a competent engineer, Mr. James R. Smedberg, to visit the city. On his declaration that new works of first-class character could be built for $150,000, all thoughts of buying out the old company, whose street mains were old and poor, were banished. The citizens voted on November 6, 1888, by the unanimous majority of 2,412 to 59 to proceed at once to city ownership.

Although Section 2486 of the "Revised Statutes of Ohio" declares that "The council of any city or village shall have power, whenever it may be deemed expedient and for the public good, to erect gas works at the expense of the corporation or to purchase any gas works already erected therein," it was thought better by the city's attorneys to secure a special enabling act if possible. Accordingly appeal was made to the legislature. The senate after some time consented. Thereupon all the gas companies, according to Mr. Israel Williams, a prominent lawyer of Hamilton, and one of the city's attorneys at the time, brought such strong pressure to bear by fair means and foul, upon the representatives, who were in most cases personal friends or dependents of gas stockholders, as to defeat the bill in the house. Therefore the city fell back upon the general law.

The next step was to refuse to make a new contract with the old company when the contract for lighting the streets expired December 1, 1888, for fear of the

legal results of "entangling alliances." Gasoline was used in the street lamps till May, 1890.

Then the private company asked for an injunction from the United States circuit court on the ground that since the constitution of Ohio did not explicitly enforce a city to construct gas works to compete with private works, the case came under the principle of a violation of contract as decided in the famous Dartmouth college case. Judge Sage, of the United States district court, with the approval of Judge Jackson of the United States circuit court, decided for the city.[1]

The gist of the decision was contained in the following paragraph:

"Inasmuch as the city has the right to permit the use of its streets by another gas company and has also the right to purchase any gas works within its limits, what is the difference in a legal or constitutional view, or so far as any impairment of the vested rights or property of the complainant is concerned, between its permitting another gas company to erect its works and lay its pipes in the streets and then purchasing those works and pipes for the purpose of manufacturing and selling gas and itself in the first instance erecting gas works and operating them?"

When the city advertised $50,000 of bonds bearing five per cent. interest for sale, there were present, according to Mr. Williams, agents of the private gas company who tried to frighten away all bidders, as at Toledo soon to be described, by threatening legal obstruction to every interest payment. Nevertheless there were seven bidders. But the three highest were either frightened or for some other reason were led to withdraw their bids, leaving the bonds in the hands of stockholders of the First National Bank of Hamilton, who soon resold in New York to European

[1] Hamilton Gas Light and Coke Co. v. City of Hamilton, in *Federal Court Reporter* 37, pp. 832-8.

parties at a premium of $1800 on $50,000. The entire $150,000 of 5 per cent. bonds soon issued were sold at a premium of $1,792.89. $10,000 of six per cent. bonds were subsequently sold to pay for meters and services, the technical name for the connections between the meters and the street mains.

As a last resort the private company then applied to the Ohio supreme court, whose decision, January 21, 1890, in favor of the city, is chiefly embraced in the following quotation,[1] though the full decision was much longer.

"It is conceded that a municipality within which a gas company has been already formed, may, by a vote of its citizens and by ordinance, authorize the operation of another gas company within its borders. The municipality may also purchase the gas works of the newly organized company. But it is contended that, if two such companies exist at the same time in the same municipality and occupying the same territory, the municipal authorities though purchasing, could not operate the works of one in opposition to the other; that after such purchase, the law will not permit the city to use its own property for the purpose of lighting its streets for the public safety and convenience, unless it either buys out the other or the other company goes out of existence or fails to discharge its statutory duty. The statute, it is evident, is not susceptible of such an interpretation, nor has the legislature in our judgment hampered by such limitations and conditions, the right of a city to purchase and operate the works of one of two competing gas companies within its borders. And if it may run and use without restriction the plant of one such company, it may well be inquired, why may not the city, so far as the other company is concerned, be authorized to erect its own gas works, whenever it may be deemed expedient and for the public good."

As, however, the defendants fought the case on the basis of supplying gas for streets and public buildings, though not pledging the city to confine itself to such in future, the private company has

[1] The State, ex rel. v. City of Hamilton, *Weekly Law Bulletin* and *Ohio Law Journal*, vol. 23, pp. 193-203.

brought a new suit involving the sale to private consumers, but has not pushed it and seems likely to drop it entirely. In view of these legal complications, now about ended, the city acting on the advice of its attorneys, according to Mr. Williard Smyers, the secretary, has *solicited* no private consumers though receiving those who applied, and has not pushed the use of gas as fuel in gas stoves.

Nevertheless its consumers numbered 612 in June, 1891, and now in July, the secretary predicts that the number will rise to 1000 by November, when the meters and services necessary to reach them have been put in by aid of a second issue of $10,000 of bonds ordered in July. The sum of $170,000 will then have been spent from the sale of bonds, and a few thousand more from the net receipts for the construction of works of the latest pattern, capable of producing and distributing 225,000 to 250,000 feet of coal gas daily, and arranged for easy doubling of this capacity at a very moderate cost—far less than the cost of the present works—necessary for making and distributing the first 250,000 feet daily.

Of course the results of city ownership in Hamilton are being watched with eager interest by many Ohio cities that may copy the plan if successful, and are being watched with very critical eyes by the alarmed private companies At conventions of gas engineers it is remarked by several superintendents of city-owned gas works that a decided coolness is manifested toward them by the majority of the gas fraternity.

If space permitted, it would be very interesting to fully relate the story of the writer's investigation in Hamilton, the last week of June, 1891. A letter had

been received from a gentleman in Cincinnati, unknown to me, but one who was on very friendly terms with the private company and who claimed to know the situation fully. It finally developed that he worked in the office of the attorneys of the private company. He held that in all his economic reading he had never come across such a story of absolute failure as in Hamilton, where not even running expenses were being paid, to say nothing of interest, and where scarcely a prominent citizen still favored city ownership. Over sixty consumers of gas had within two months, "I know from a personal inspection of the gas company's books," gone back to the old company, and the two daily papers of the city which had done much to secure public ownership shared fully in this absolute revulsion of public sentiment, "and are now demanding that the city dispose of the works on the best terms possible."

A more complete, though we will assume, honest mistake as to facts has never come to the writer's notice. Every statement made by this economic student in Cincinnati was investigated with all the fullness that the time at my disposal permitted, assisted by all the aid he could give in subsequent letters when called on for particulars. Of course no one can make sure of entire freedom from error and no such claim will be made here. One must depend to a large degree on official statements and the books of the public works freely opened to inspection.

The facts in Hamilton seem to be as follows:

During the first year ending April 30, 1891, the total gas made was 30,435,800 feet, of which 27,142,400 was used in the burners of private consumers and in public lights, 15,511,500 feet in the former

and 11,630,900 feet in the latter. The remainder, 10.8 per cent. of the whole was used at the works and office or lost in leakage. This leakage will be much less during the present year, for it and the gas used at the works, etc., were only 4.89 per cent. during the last six months of the first year. The entire expense, exclusive of the new services and meters, and perhaps a few street mains needed to supply the rapidly growing number of consumers, was $13,153.89 after deduction of the receipts from residuals of $6,570.32. The net cost was thus only 48.4 cents per thousand feet in the burner. If we substract this $13,153.89 from the $15,511.50 due or collected, and nearly all has been collected from private consumers, we have a net profit of $2,357.61, and the 11,630,900 feet of gas burned on the streets and in public buildings.

From this net cash income and from $5,078.69 paid by the city on account of its gas, a sum of $7,436.30 was spent on the meters and services and other extensions between October 10, 1890 and May 1, 1891. From further payments for gas by the city there was spent $2,006.77 for lamp lighting. The city agreed to turn over to the gas company $15 a lamp a year for the 683 street lamps and $7.50 a lamp for 23 park lamps or $10,417.50, which amounts to 90 cents per thousand feet on the 11,630,900 feet of public consumption. The city then appears to have owed its gas company over $3,300 in cash at the end of the year. The only reason for the use of the word "appears" is the over-sight of the writer in not getting the precise amount from the secretary of the city company. The latter did write, however, July 6, 1891: "The

city is five months behind the payment for street lighting to the city to the amount of $4,316.28."

Had the city of Hamilton therefore chosen to hand over to the gas company full payment at one dollar per thousand feet for all the gas it used, and had it also paid for the lamp lighting, as it would have had to do if the gas had been furnished by a private company, the city company on May 1, 1891, would have had a cash balance of about $6,500, or sufficient, with the surplus of the following three months, to have put in all the meters and services needed. The fact that the city having used this surplus for other and perhaps more pressing needs, felt it wise to vote an appropriation of $10,000 of bonds for such extensions, is no evidence of unprofitableness in the manufacture and distribution of gas by the city.

The entire debt when these bonds shall have been sold will be thus $170,000. In return for this and for an expenditure on extensions of say $10,000 out of the earnings since April, 1890, the works will surely be able to show during the present fiscal year ending April 30, 1892, a sale of 40,000,000 feet to the city, and to 800 or 1,000 private consumers at an expense including eight per cent. for interest and sinking fund on all the cost, of less than 70 cents per thousand feet. The expense during the last six months of the first year was only 72 cents, of which the eight per cent allowance for interest and taxes was 36 cents.

Inquiries made at random of the merchants doing business along the leading business street at Hamilton failed to bring out aught but confidence in the success of city ownership. Both papers were found still to be hearty believers in Hamilton's experiment. The

editor of one paper declared that if a vote were again taken on city ownership the vote in its favor would be one hundred to one. Despite the lack of sufficient appropriation from the council for meters and services during April, May and June, and the legal complications preventing solicitation of patronage for light and fuel, the number of consumers increased during those three months from 575 to 612, and since July 1 the increased appropriation for services has led to a rapid increase of consumers, which is expected to continue until, as previously stated, 1,000 consumers have been secured during the winter.

Again, instead of sixty changing from the city gas company to the old company during May and June, only three such could be discovered. My Cincinnati informant, when asked for the names of the sixty, admitted that he had been misinformed and that they had merely changed to electricity, which only the old company furnishes. Even the latter point was disproved, if Mr. Smyers, the clerk of the city company is to be believed, as I think he is. For of the thirty-nine persons whose names were finally sent me from my informant as changing from the city company to electricity, only twelve were found to have ever patronized the city company, and eleven of these still use a considerable amount of city gas, merely placing an electric light in front of their saloon or store.

Finally it was found that during the six months ending July 1, with the old company and June 1 with the new company, the average daily sale of gas to private consumers was 57,262 feet by the city company and 21,000 feet by the private company, while the former used 38,137 feet daily in the public lighting. The latter now uses 15,000 feet of its gas daily

in a gas engine with which it makes part of the electric light sold to many of the stores. The old company seems likely gradually to desert the gas business for electric lighting.

The city is considering the propriety of owning an electric light plant, or of raising the candle power of its gas from 18 to 24 by spending $25,000 on a water gas plant of an hourly capacity of 10,000 to 20,000 feet, which would simply be used in connection with the coal gas plant, and would increase the capacity of the works at small expense. The city will probably, however, insist on proving conclusively, as it seems sure to do, the success of its present works before adding much to them.

The cost of these works up at least to October 10, 1890, and I think nothing was thereafter added up to May 1, 1891 save from the earnings, was approximately $171,284.34. With this sum 600 services costing $15 apiece were put in, works of the latest design with a daily capacity, as previously stated, of 225,000 to 250,000 feet, and 1⅓ miles of 12-inch pipe, 3½ miles of 8-inch, 1½ miles of 6-inch and 21½ miles of 4-inch pipe, or 27.9 miles in all of mains were constructed or laid, 682 lamp services, and 200 new lamp posts and appurtenances were also put in place. The real estate and grading about it cost $5,214.63. The service account, including lamp posts and meters, cost $18,278.10, the rest of the distributing system with its share of salaries and miscellaneous expenses about $99,000, and the manufacturing part $66,750.

To sum up, Hamilton makes gas for 28 to 35 cents in the holder, and delivers for such a sum as to make the total cost only 48 cents the first year

and 36 cents the last six months of that year, exclusive of interest and sinking fund which will not raise the cost above 70 cents as soon as the consumption increases to 40,000,000 feet as it will do this year. Even the first year, with small consumption and large leakage during the first six months, the cost inclusive of interests at 5 per cent. and a 3 per cent. sinking fund, was only $1. Evidently private competition will ere long become insignificant and even disappear, while Hamilton's already assured success will make many converts to city ownership in Ohio.

Toledo, Ohio.

Although this flourishing city of 81,000 inhabitants does not make its illuminating gas, it has just completed natural gas works which will bring fuel gas from fields forty or more miles away, recently purchased by the city. The contest over the right of the city to do this is one of the most memorable in recent monopolistic history. When, about two years and a half ago, the citizens of Toledo voted by a majority of over sixty per cent. of those voting, as required under the state enabling act, to issue $750,000 bonds with which to buy land and lay mains, the branch of the Standard Oil Company then supplying such gas to Toledo began a remarkable opposition. This opposition may not have been legally proven to be due to the Standard Oil Company, but is so understood by nearly every one in Toledo.

An injunction was first sought from Judge Jackson, of the United States circuit court, on the ground, not that any contract was being broken, for no such thing was charged, but that it was not a

function of city government to supply fuel or other gas to private consumers, when this, rather than the supply to the streets and public buildings, was the chief object of the city.

At this hearing, at which the writer was present, it was exceedingly amusing to hear one of the Standard Oil attorneys argue that for Toledo to sell natural gas, even at a price high enough to cover interest and all other expenses, as intended, is "communism, it is the theory of Herr Most;" and again, "Governments exist for the protection of life and property, but of the two property is the most important, for if you do not protect life you have anarchy, to be sure, but if you do not protect property you have something worse than anarchy!"

Still more amusing was it to hear St. Paul, the great apostle to the Gentiles, quoted to sustain the Standard Oil Company, by a millionaire attorney, famous for his achievements as a "railroad wrecker," in the parlance of the day on Wall street. He remarked that it injured one's energy and freedom to have the state provide fuel for his family. "I have always tried to provide for *my* family, and St. Paul has well said that 'he who does not provide for his own family is worse than an infidel.'" It were enough to make the apostle turn in his grave, could he hear himself thus quoted in such a cause!

Judge Jackson declared, without leaving his seat, that not only might the Ohio legislature grant such power, as it had done to Ohio, but it might, if so desired, and if its own state constitution allowed, own a railroad across the state and transport everybody free at the expense of the tax-payers.

The chief points in Judge Jackson's important and epoch making decision as subsequently written out by him were as follows:[1]

"Unquestionably the legislature may authorize a city to furnish light or facilities for transportation or water to its citizens with or without cost as the legislature or city may determine. So long as the act is for the benefit of the public or the entire municipality, it does not lose its character as an act for a public purpose so as to become private in the sense that prevents the exercise of the power of taxation. . . . . The question of public interest determines the question of right to supply gas and water, and not the mere location of the works or source of supply . . . . . Since the decision in Sharpless v. Philadelphia, 21 Pa. St. 147, it is no longer an open question whether municipalities may engage in enterprises such as the one contemplated by the act in question in this case."

After this decision, the Standard Oil Company, according to my informant, a leading citizen and alderman of Toledo, determined to prevent the city from finding a market for its bonds. In order to impair its credit, circulars were sent to all the large brokers of the country, claiming that Toledo's credit was poor, that the gas lands she was about buying were worthless, and that even the validity of the bonds was in litigation in the courts. The latter was true, for an injunction was sought in the Ohio supreme court and then not pressed to a settlement, so as to keep it hanging over the city, until finally the latter was forced to bring a similar action by collusion against itself, in order to secure a decision. Also, this friend of the people, the Standard Oil Company, is said by my informant to have purchased one of the leading Toledo papers, and to have put one of its own men in charge, in order to further checkmate the city and control public opinion. But all was to no purpose. The Ohio supreme court granted

[1] *Federal Court Reporter*, vol. 39, pp. 651-4.

to the city the desired permission in March, 1891. The bonds were finally sold and the works were all completed by May, 1891, save the laying of the street mains, which was still in progress. The expense of the work and the delay entailed by the opposition of the Standard Oil Company was, however, a serious burden to the people of Toledo.

Mayor Hamilton, of Toledo, writes to another, under date of January 19, 1891:

"I may say that my experience and study of municipal affairs since I have been Mayor of Toledo have led me to change the views I formerly held of opposition to the municipal ownership of any enterprise which could properly be operated by private capital, and I should be willing to see not only water works, but gas and electric lighting, and even street car lines operated by the municipality, for I believe, generally speaking, the public would get honest service, as well as the profits accruing from such enterprises, and the constant struggles and questions as to the large profits made by private owners would be done away with.

"It should be remarked, however, that in Ohio the municipality has the right to regulate by ordinance prices which may be charged by companies performing this kind of public service. Experience, however, shows these regulations to amount to but little, unless the companies themselves agree to the terms of the ordinance."

Mr. A. E. Macomber, of Toledo, writes me July 22, 1891, as follows:

"The rate for natural gas for domestic use in Toledo, charged by the Standard Company, was and is 12 cents per 1000 cubic feet. The rate now made by our city line is 8 cents per 1000 cubic feet. So far, meters have not been in general use, and the "Mixer" measurement has been used instead. And the "Mixer" charges have been by the Standard Company for cooking or heating stoves in an average family per annum $21, and for the same by the City Pipe Line $16.50.

"Were it not for the city line the Standard would soon charge 25 cents per 1000 cubic feet. In Columbus in this state that is the charge now made. Last winter, in that city, the gas was cut off until the city council came to terms, notwithstanding an agreement at 12 cents, which had some years yet to run. The City Pipe Line protects Toledo from this manipulation.

"In Detroit the rate is 25 cents per 1000 cubic feet. A curious case is now pending in the United States circuit court in that city. It appears that the original "promoter" of the Detroit Gas Company was to have for his services a liberal share (one-sixth, I think) of the stock. After the business was in full operation an attempt was made to squeeze him out. He brings his proper action. The answer indicates a conspiracy on the part of all the others to defeat him. Finding himself being driven in a corner and standing alone, he replies and puts in evidence all the letters, telegrams and memoranda between the parties from the beginning. All this is printed in pamphlets, and it appears that the several parties estimated that the outlay would not exceed $1,000,000. The company was organized with $3,000,000 capital. Mortgage bonds to the amount of $1,000,000 were issued. With the sale of these the lines was to be constructed. The bonds did not sell readily and it become necessary to give each purchaser of bonds a required amount of stock. About half of the bonds were disposed of to Detroit citizens. At the same time the bonds of the city of Detroit sold at 4 per cent. interest. This private company for the supply of fuel gas, issued $1,000,000 6 per cent. bonds, $3,000,000 of stock (all water) and makes a rate to meet interest charges upon the full $4,000,000.

This furnishes a striking illustration of the advantages of municipal ownership."

As this goes to press, word comes that the price of natural gas at Springfield and Dayton, Ohio, would have been raised early in July by the private company from 12½ cents to 25 cents a thousand feet had not threats of law suits by these places temporarily hindered such rise. Toledo, with public ownership and gas consequently at eight cents can well rejoice over the results of its great fight for industrial independence of private monopoly.

English Experience in City Ownership.

The valuable experience of England in city ownership, much more extensive than our own, is so admirably summed up by Professor Sinclair in the

monograph[1] elsewhere mentioned, that a page will be quoted therefrom.

"According to returns given in an English Parliamentary paper, there were, in 1889, in the United Kingdom, 405 gas works owned by private companies, operating with a capital of £38,000,000, and 173 owned by municipalities, worth £21,600,000. The average production, in cubic feet, of gas was, for the private works, about 147,000,000; for the public, 171,500,000, or one-tenth more—*i. e.*, public works are larger than private. From each ton of coal used the private companies get 10,242 cubic feet of gas, while the public works get 9,975. This difference may arise from the different grades of coal used, or from the different processes used in extracting the gas. A process which extracts more gas from coal leaves the residuals less valuable for the purposes to which they are applied, *e. g.*, the production of dyes, ammonia, etc.; and it is a question how far the baking process should be carried in order to give the best financial results. The difference in policy pursued in this respect seems to have been decided upon some years ago, as the average since 1881 has been, for private works, 10,235 cubic feet of gas per ton of coal, and for public works, 9,986 cubic feet. A matter of much more importance, as showing the comparative efficiency of public and private management, is the amount of gas actually consumed as compared with that made, the difference representing the leakage that occurs. The private companies delivered 92⅕ per cent. of the amount made, the public 91⅛ per cent., the private companies having the advantage of about ⅞ of 1 per cent. in the efficiency of their systems in preventing loss of gas. Both private and public are gaining in this particular, as the average for the last eight years has been 91.92 per cent. and 91.08 per cent., respectively, or a gain on the part of the private companies of ¼ of 1 per cent. and on the public ¼ of 1 per cent. The public works are thus coming up to the private in this respect.

"The greater loss through leakage experienced in the public gas works may necessarily accompany a division of the supply among a greater number of consumers, and the increased number of fittings rendered necessary by such minute subdivision. The average number of consumers on private works is 2,787; the average number of consumers on public works is 6,646; so that the average amount used by each customer on private works is 52,800 cubic feet, while the average amount used by each customer on public works is 27,500 cubic feet. With the same sized families, etc., the public works will require almost twice as many services as the private. The

[1] "Municipal Monopolies and Their Management."

public works seem to be administered as effectively as they would be if they were under private management, judging by these results. Further, the public provision of gas has had the effect of making its use in small quantities much more general than where private companies provide the supply. Recognizing the importance in city life of this extension of the use of gas, Birmingham is completing a system by which it can be delivered in as small quantities as one pennyworth at a time.

"The cost of private works was about £80,000 each. Public works each cost half as much again, while, as we have seen, dividing one-tenth more gas among twice as many people. Whether this greater cost of the municipal works was necessary under the circumstances is a question for experts.

"The public works, in addition to covering expenses and establishing a fund of 4½ per cent. to 5 per cent. per annum to pay the interest on loans, annuities, sinking fund, etc., have poured into the civic treasuries in eight years the sum of £3,550,000, or seventeen and three-quarter millions of dollars as a surplus, which has gone to the lessening of the burden of general taxation in their respective cities. But the price of gas in municipalities providing their own supply is necessarily enhanced by this method of raising money, which is virtually a tax on coal.

"Notwithstanding the increase in the price of gas supplied by the municipalities in order to obtain this surplus, and also the fact that in many places the authorities provide the public lighting free, the price of gas from the public undertakings is less than that charged by the companies, as the following returns for the years mentioned show:

AVERAGE RECEIPTS PER THOUSAND CUBIC FEET OF GAS SOLD.

	1889.	1888.	1887.
	s. *d.*	*s.* *d.*	*s.* *d.*
Companies.....	3 7.42	3 7.9	3 8.52
Local authorities.....	3 3.67	3 3.12	3 3.34
Companies' over-charge...	3.75	4.78	5.18

"If the expenses of municipalities in managing their works are less than those of companies, it may be a valid excuse for the latter to charge more. Let us, then, compare expenses:

EXPENSES PER THOUSAND CUBIC FEET OF GAS.

	1889.	1888.	1887.
	s. *d.*	*s.* *d.*	*s.* *d.*
Companies.....	2 6.74	2 5.65	2 6.68
Local authorities.....	2 4.4	2 3.14	2 3.67
Companies' over-expense..	2.34	2.51	3.01

	s.	d.	s.	d.	s.	d.
Companies' profits.....	1	0.68	1	2.25	1	1.84
Authorities' "		11.27		11.98		11.67

"From their profits, companies paid average dividends of £8 11s. 0¼d., per £100. During the previous year they paid £8 10s. 11¼d."

It thus seems that in 1889 the public works sold gas for 3s. 3.67d., or 82 cents, and made a profit of 11.27d., or 22½ cents, besides paying interest and sinking fund. The real cost to the local authorities was, therefore, only 59½ cents per thousand feet in the public companies, as compared with 3s., 7.42d., or 90 cents, where the works are owned by private companies. It is possible that five to ten cents should be deducted from the latter for taxes. The form of statement does not make this clear. Even if this be so, the net price in the private companies would remain at or above 80 cents, being fully 20 cents or 34 per cent. above the real cost of gas in the public companies.

In this connection the following remarks of President Hepworth, of the Incorporated Gas Institute of England, and the engineer of one of the largest municipal gas works of England, at the annual meeting of the Institute in the summer of 1891, will be of great interest:

"For more than forty years the gas works in this city have been in the hands of the corporation, and having occupied the position of engineer and manager for more than twenty years, I have occasionally imagined that I possessed the necessary qualifications, but it is always well to 'see oursels as ithers see us,' and the other day I had this opportunity. In a recent number of an American scientific paper, I read as follows: 'Works owned by corporations in England are not so skillfully superintended as those owned by companies. Improved appliance and processes are not favored by municipal boards of control, as has been proved again and again by the course of events in England.' Such a statement can only have been made by a person utterly ignorant of the facts, and would be too absurd

to call for notice but for the danger there is that it may, in some instances, become true, if we may judge from some of the tendencies that have been seen of late. What are the facts of the case? The local authorities, as has been stated before, own about one-third of the authorized gas works of the United Kingdom. Their reports will show that in many instances these works, acquired at high premium prices, have been skillfully superintended, 'improved appliances and processes' have been introduced, all legal obligations have been met, and the public supplied with gas at as low a price as in any comparable town. Whether this will always be the case must rest with the local authorities themselves. They can obtain modern appliances, and they can secure men of the highest qualifications for their service, so long as the conditions are what they ought to be; and if they are content with inferior service it is always to be had. * * * * * * * * *

"What I would plead for, however, is that corporations and local authorities having gas undertakings under their control should—in their own interests—follow as closely as possible the practice existing in the best private undertakings of the same kind. Unlike other public departments, the gas department is of a technical and commercial rather than an administrative character. Let them secure the services of a thoroughly competent manager as the head of the department—one worthy of their confidence—let there be no unnecessary interference with his work on the part of persons who, with even the best intentions, can only hinder the progress of the department, and, above all, let no question of party politics enter into, much less dominate, a department which exists, not for party, but for public purposes, and the most likely effect of which would be to convert the department into a target to be shot at on both sides.

"Under the conditions which exist in some towns that might be named, men of high character and ability will hesitate before competing for public appointments. They believe, with Lord Dufferin, who recently said, at St. Andrews, that: 'Our usefulness, as well as our happiness, depends upon our work being done in a congenial atmosphere, and it is much better to choose a humbler, less promising, or less remunerative walk in life, in which we are certain of personal satisfaction, than to commit ourselves to an employment which may, perhaps, prove distressing to our tastes and unsuited to our faculties.'

"If the time should ever come when considerations of the character I have spoken of are disregarded, then, and not till then, will it be true that the 'works owned by corporations are not so skillfully superintended as those of private companies.'

"There have been and are one or two large gas undertakings in the country where such considerations have been disregarded, and some sort of foundation exists for the criticism alluded to. The undertakings to which I refer are at this time without a properly qualified head, and share in all the disadvantages of divided control, or no control at all. Although in other respects they may be served faithfully by men with some excellent qualifications, these undertakings would, if closely examined, be found to fail at almost every point indicative of good management; and it is a matter of surprise that this should not have been seen by those who have the strongest reasons for recognizing the fact. Such instances are certainly open to the strictures of either American or English critics. I can express myself thus freely on this point because I speak in a city governed by a corporation which, in the conduct of its gas undertaking, has certainly not rendered itself amenable to any such criticism.

"Before passing from the subject it must be said that, as a rule, the management of gas undertakings in this country is just as successful under a local authority as it is under a company, or *vice versa;* the exceptional cases I have adverted to being just sufficient to prove true."

Other Forms of Public Control.

Three may be mentioned. First is the English plan of fixing the price and the maximum of profits in the parliamentary grant of the franchise, with a permission to increase the dividends a given percentage (usually ¼ per cent.) for every given reduction (usually one penny) in the price of gas. Under this system the price in London has fallen from $1.08 to 64 cents, and profits have risen to 14¾ per cent. in the case of the South Metropolitan Company. But this system is weak from the difficulty of properly fixing the terms of the charter and of preventing some over-capitalization. Though much better than unrestricted private management, this system seems to be gradually yielding in England to public ownership as still more satisfactory. The number of public

companies in England in 1882 was 148 out of 500 both public and private, and in 1889 was 173 out of 578. The percentage grew only slightly in the number of companies, being 29.6 per cent. in the former year and 30 per cent. of all in the latter, but measured in the amount of gas consumed, it appears that the public companies supplied 31.7 per cent. of all used in the United Kingdom in 1882 and 33 per cent. in 1889. The number of consumers of the public companies was 916,962 in 1882, or 46.5 per cent. of the whole, and in 1889 had grown to 1,115,267, or 49.7 per cent. of all.

By the Ohio plan, power is lodged in each city council to reduce the price of gas at any time. This is subject to many abuses. It involves repeated "raids," and perhaps honest attacks by ignorant councils. Even when the council is right in ordering a reduction, the difficulty of proving it, in the absence of any power to thoroughly investigate the acts of the private company, tempts to great litigation on the part of the gas company, to the serious burden of the people. The somewhat hasty action of the Cleveland, O., city council one night in May, 1891, in ordering the two gas companies of that city to reduce the price to the city and private consumers from $1.00 to 60 cents, without, it is claimed, allowing a hearing to the companies or letting them know of the proposed action, has, though still contested in the courts, increased the previously existing desire among private companies to take refuge in a state gas commission like that in Massachusetts. The Ohio plan has not prevented recent city ownership in Hamilton, and agitation for it in Cincinnati and other places. Probably the cost of gas, including

the market rate of interest on the cost of duplicating the works, would be about 60 cents under city ownership in Cleveland, for it has been seen to be only 67 cents in Wheeling, which labors under the great disadvantages of being a far smaller city and of furnishing a much poorer market for the by-products of gas manufacture than Cleveland, but it is likely to prove difficult to secure as low as 60 cents from the private companies there. City ownership would be a better plan in Cleveland, one would suppose, than expensive litigation with the private companies.

The Massachusetts plan of a gas commission was fully described and highly praised to the unwarranted depreciation of city ownership by Mr. George K. Holmes in the *Political Science Quarterly* of September, 1890. This gas commission of three men, appointed by the governor, has recently issued its sixth annual report for the year 1890. The chief features of the Massachusetts law (which is excellent of its kind and worthy of adaptation in every state) are these: All gas companies are forbidden to issue stock dividends, must keep their books in a manner prescribed by law, and render full report to the gas commission. These reports are in part published yearly, the names of the companies being in many cases suppressed in print. The gas commission must frequently inspect the quality of gas, the pressure, meters, etc., and, by examination of all other points, must keep informed as to the obedience to law of both gas and electric light companies. On petition of the mayor of a city or the selectmen of a town, or twenty customers of a gas company, a thorough investigation must be had, and the price may be reduced by the commission. In case of disobedience

to law, or non-compliance with the orders of the commission, the matter is turned over to the attorney-general. The writer is only aware, however, of two such reductions in price, one some years ago in Worcester and one recently in Chelsea, where the price was reduced from $1.96 net to $1.80 for small consumers and $1.75 for large.

With so few reductions of price, the existence of a commission has failed to prevent the rise of such a demand for municipal ownership as to result in the passage through the state legislature in May, 1891, by a vote of 158 to 30 in the house and 22 to 10 in the senate, of a bill permitting city ownership of gas and electric lights, and half a dozen towns are said to stand ready to begin ownership as soon as possible. The struggle over the granting of petitions for this purpose had become a prominent issue in the politics of that state, thanks partly to the nationalists. To refer briefly to the past history of the bill, it may be stated that in the session of the legislature for 1889–'90 the house of representatives, by a vote of 104 to 34, gave the desired permission in response to a petition bearing 12,000 signatures. The question of constitutionality was then referred to the state attorney-general, Mr. Waterman, who declared that the legislature had no right to grant such power. The supreme court took the opposite view and declared that the legislature did have the power. The opinion of the court, 150 Mass., 592, given in reply to the questions of the legislature, is so important and lays down such general principles as to merit some quotation—

"Artificial light is not, perhaps, so absolutely necessary as water, but it is necessary for the comfortable living of every person. Although artificial light can be supplied in other ways than by the use of gas and electricity, yet the use of one or both for lighting

cities and thickly settled towns is common, and has been found to be of great convenience, and it is practically impossible for every person to manufacture gas or electricity for himself.

"If gas or electricity is to be generally used in a city or town, it must be furnished by private companies or by the municipality, and it cannot be distributed without the use of the public streets or the exercise of the right of eminent domain.

"It is not necessarily an objection to a public work maintained by a city or town that it incidentally benefits some individuals more than others, or that from the place of residence, or for other reasons, every inhabitant of the city or town cannot use it, if every inhabitant who is so situated that he can use it has the same right to use it as the other inhabitants.

"It must often be a question of kind and degree whether the promotion of the interest of many individuals in the same community constitutes a public service or not. But in general it may be said that matters which concern the welfare and convenience of all the inhabitants of a city or town, and cannot be successfully dealt with without the aid of powers derived from the legislature, may be subjected to municipal control, when the benefits received are such that each inhabitant needs them and may participate in them, and it is for the interest of each inhabitant that others as well as himself should possess and enjoy them.

"If the legislature is of opinion that the common convenience and welfare of the inhabitants of cities and towns will be promoted by conferring upon the municipalities the power of manufacturing and distributing gas or electricity for the purpose of furnishing light to their inhabitants, we think the legislature can confer the power."

The bill that passed the house, granting the desired permission for municipal ownership, failed in the senate in 1890, only to pass that body in 1891, by a vote of over two to one, and to become a law as above stated.

The Massachusetts law as finally passed is quite long. It is given in Appendix B of this monograph, as well as the much shorter Tennessee law passed three months before. The Massachusetts law is regarded by the advocates of city ownership as too conservative, and efforts will undoubtedly be made a

year hence to amend the law. The provisions most complained of are those requiring a vote of the mayor and two-thirds of each branch of the city council in two successive years, and then of two-thirds of all the people voting at two legal town meetings, from two to thirteen months apart, before public ownership can be entered upon. If the people refuse to vote for public ownership, they cannot vote again on the question for five years.

Private companies are allowed to sell to the city when ownership is so voted, if they desire, and the appraisers appointed by the state supreme court, in case of failure of the parties to agree on the price, must include, "as an element of value, the earning capacity of such plant, based upon the actual earnings," at the time of the city or town vote; but "such value shall be estimated without enhancement on account of future earning capacity, or good will, or of exclusive privileges derived from rights in the public streets."

This provision also is too stringent, for the earning capacity, on the basis of which the price is to be in large measure determined, is usually far higher than it should be because the price of gas to the consumer has been too high. This is due to the monopoly character of the business. In a monopoly, prices are not regulated by the cost of the service, but are at such a point as will yield the highest net profits. This Massachusetts law then provides that the citizens shall pay over to the owners of a private gas plant not only the value of the buildings, mains and works, but the value of the monopoly itself, which the company never created.

It cannot be replied that the state has vested in the private corporation absolute property in the monopoly and its earnings, for the state reserves the right to charter rival gas or electric companies, or to place a special franchise or income tax on the monopoly or its earnings.

Further, states have the right to reduce the price of gas as of water or railroad rates, and thereby reduce the earning power and so the capitalization. Note the decision of Justice Brewer of the United States circuit court in Chicago & Northwestern Railway Company vs. Dey, rendered July 27, 1888:[1]

"Where the proposed rates will give some compensation, however small, to the owners of the railroad property, the courts have no power to interfere. Appeal must then be made to the legislature and the people. . . . Compensation implies three things: payment of cost of service, interest on bonds and then some dividend," which Justice Brewer declares may be only one per cent. or even less. If, then, the state may reduce capitalization indirectly, it may surely refuse to pay for a monopoly a capitalization based on monopoly profits, which the state has the right to sweep away. A very prominent lawyer and noted ex-governor of Massachusetts informs me that this principle has been frequently applied to water and bridge companies in that state when the public authorities have made use of their right of compulsory purchase always reserved to the state in the case of such natural monopolies. Private water and bridge companies are very often, he says, allowed less than their earning power would make capital invested in private business worth. Since there is

[1] *Federal Reporter*, vol. 35, p. 879.

no good reason for reversing this maxim of law and wise public custom in the case of gas companies, it is to be hoped that the next legislature will modify the gas and electric light statute in this particular.

Probably the half dozen towns and cities in Massachusetts that have already appointed committees to consider the advisability of public ownership of gas or electricity will wait a year and see if a better statute cannot be secured. Some friends of city ownership have also advised a little delay to see if new and greatly cheaper methods of gas manufacture are not about to be discovered. This is very doubtful. Of course great improvements are yearly made, but any mode of manufacture that claims to reduce the cost one-half or more at once will probably be found on inspection to reduce cost only nominally and at the expense of heating or lighting power per foot of gas.

The Tennessee law, given in Appendix C, is free from these objections and has well provided that the net revenue from city ownership must go to reducing the debt or improving the works. Hence when these two items will not absorb the revenue there must be a reduction in the price of gas.

Perhaps the best law on the subject of the acquisition of a private plant by a municipality, though the time limit may be excessive, is that passed in England in 1882, being section 27 of the electric lighting act of 1882.[1] It provides that the local authorities may require a private company, forty-two years after the granting of its charter and at stated times there-

[1] My attention was called to this act by the monograph on "Municipal Monopolies," by Professor A. H. Sinclair, published by University College, Toronto, p. 35.

after, to sell the plant, etc., at its market value, "but without any addition in respect of compulsory purchase or of good will, or of any profits which may be or might have been made from the undertaking."

The Massachusetts law provides that for the construction or purchase of a plant bonds may be issued, payable in a term not exceeding thirty years, and bearing interest not exceeding five per cent. No indebtedness for such purpose can be secured in excess of five per cent. of the total valuation in the case of a town, and two and one-half per cent. in the case of a city. The works that may be thus established must be under the control of a superintendent, appointed and removed by the mayor of a city or the selectmen of a town.

The ninth section is very wise, applying as it does to public companies the same requirement of keeping the books and accounts in a uniform manner prescribed by the gas commissioners as is applied to private companies. Nearly all public as also private gas companies should reform their modes of bookkeeping. In many cases now it is a very tedious process to extract therefrom important items of information.

Theoretical Basis of Public Ownership.

This subject has been well presented by Professor James in his monograph previously referred to, "The Relation of the Modern Municipality to the Gas Supply"; by Professor H. C. Adams, in another monograph of this series, "The Relation of the State to Industrial Action"; by Professor R. T. Ely, in his "Problems of To-day" and other writings, and by

Professor Sinclair, in his "Municipal Monopolies." But as these may not be familiar to all readers of the present monograph, and as attempts have been made to refute the arguments of the above writers, a brief survey of the theory of city ownership of gas works will be attempted. Such a survey is more fitting after the presentation of the facts in the preceding pages, on which theories can be based, than would have been a similar survey at the beginning of this monograph.

The following are the chief arguments usually given as reasons for city ownership:

I. The financial benefits to the community in the shape of cheaper gas, or more revenue to the municipality. What private gas works, under similar conditions as to size, cost of coal and market for residuals, give the citizens the benefit of such cheap gas as do the public works as revealed in Table XII? There the cost to the city of gas, aside from interest and taxes, was shown to be only 40 cents in Wheeling, 44.5 cents in Bellefontaine, 48.4 cents in Hamilton, 83.5 cents in Richmond, where coal is higher, 84 cents in Philadelphia, 87.6 cents in Henderson, $1.00 in Charlottesville, $1.14½ in Danville and $1.21 in Alexandria. It must be borne in mind that the last four cities, from their small size and high price for coal or low price for residuals, or both, cannot make gas at anywhere near the price of larger and more favorably situated places. It must also be remembered that the above costs included the expenses of improvements and extensions during the last fiscal year, which in some cases were exceptionally large.

In that same Table XII it was shown that the cost of gas, even including 8 per cent. on the value of the

plant for interest and taxes, though public owned works do not have to pay the latter and are, in most cases, out of debt, was as follows: Wheeling, 67 cents; Bellefontaine, 83 cents; Hamilton, $1, but in the last half of the year only 72 cents; Philadelphia, $1.08; Richmond, $1.11; Henderson, $1.36; Charlottesville, $1.46; Alexandria, $1.58, and Danville, $1.59. These figures appear to be lower than any prices charged for gas by private companies under similar conditions as to population and prices of coal, coke and tar.

The self-interest of a private gas company always leads to making as much profit as possible. The same self-interest of a public-owned monopoly is to render the service as cheaply or to get for the city as much revenue as possible. Competition in gas has been proven impracticable. Even regulation by the state, as in Great Britain, Massachusetts and Ohio, is not working well enough to prevent a rapidly growing preference in all these places for city ownership. A private company, despite having to pay higher interest than public companies, may manufacture gas as cheaply, but the public do not, if my investigations prove anything, get as much in the shape of either money or good government out of private as out of public owned gas works.

Not only do public companies pay dividends or interest on what is very often twice and occasionally three or four times the capital that is necessary, and not only is more of interest or profits rightly expected by private investors than is asked when the city borrows, but there are other serious disadvantages to which a private company is subjected. It must at times, in the majority of places, buy off "raids"

made in city councils and legislatures by boodlers who introduce bills fraught with danger to the private monopoly and then, through an agent, require a bribe as a condition of stopping the bill.

Other reasons leading one to expect greater cheapness of a public gas company are presented by Mr. A. R. Foote, of the United States Census Bureau, department of electricity, though he uses the points for another purpose. He claims that a public company has economic advantages over a private company at present in the fact that the franchise of a public company is unlimited, exclusive and unrestricted. Unlimited, because public ownership, if proven a success, will never be abandoned; exclusive, because government "must be absolutely supreme in its sphere of action or it cannot govern, and unrestricted, because free to adopt all improvements," *e. g.*, able to change from coal gas to water gas or electricity "without restraint from its franchise."

No one will deny the importance of these economic advantages. Few, however much opposed to public ownership, will think it safe, as does Mr. Foote, to give similar unlimited, exclusive and unrestricted franchises to a private company. The danger of abuse is too great. If a community could be found willing to make such an absolute grant of power to the private company that would bid highest for the privilege, is there not every likelihood that such a community, while perhaps for a little while securing thereby as cheap or cheaper gas than it could get from a public company, would in the long run find that the introduction of new processes, such as are constantly being invented, would so reduce the cost

of making below the contract price as to make the city regret its surrender of an unlimited franchise?

Again, it is very difficult to secure competitive bids for the manufacture of gas from reliable parties, so great is the capital needed and so corrupt are the city councils known to be that have to act on such bids. Even apart from corruption, a council would often hesitate about giving companies from another place a chance to displace local capital owned by men of influence. So unlikely are American cities, for these reasons, to give to any private company such unlimited, absolute franchises as those above referred to, that the economic advantages of such must continue to adhere only to public companies.

It is said that private companies have more enterprise in adopting improvements, etc., than public companies. This claim may be doubted. Competition in the gas business is impossible, save perhaps with electric light companies, and even in that case is not likely to be permanent, for gas and electric light companies are fast consolidating. It is only in competitive business that the superiority of private initiative is very manifest. Private gas companies, with an assured monopoly, often feel less impelled to make improvements than public companies controlled by the voters, whose demands for cheap light can be brought to bear upon their own agents far more easily than upon private companies. Witness the able paper by E. G. Cowdery, at the eighteenth annual meeting of the American Gas Light Association, in October, 1890. In this paper, given in the *Progressive Age* of November 1, 1890, Mr. Cowdery, while stating that improvements are constantly being made, holds that there is still great need for better

management. "There is no doubt," he says, "but that the [gas] business and progress in it has been greatly retarded by methods which are not sound in principle, but greatly speculative in their nature." He finds the same mistake "frequently made" by private companies which has seemed to the writer an occasional though not universal fault with public companies—a failure to secure expensive, but desirable, permanent improvements. In an editorial endorsement of Mr. Cowdery's paper, the editor of the *Progressive Age* remarks:

> "Had the average gas man been more progressive, more willing to thoroughly post himself upon the real merits of new ideas, new processes and new enterprises, we believe that his business would to-day be better and his profits larger. * * * It is astonishing how many superintendents and managers, when pinned down to details, have to confess ignorance of the real cost of gas in their own holders."

Some cities will certainly continue to entrust their works to private companies, and if there are any improvements developed by them we may be sure that the public demand for cheap gas or large net revenue will lead to their speedy adoption by the public companies. It is entirely practicable, however, for those cities which are afraid that public management would not equal private, to buy the gas delivered in the holder by a private company, as in Philadelphia, the city taking charge of the very simple process of distribution. If the city owns the entire plant it can readily secure competition in bids for the manufacture of gas for a period of five years. Nashville has, as previously stated, found it easy to secure such bids.

It may be asked, Is it likely that the state or city could own and operate all monopolies or partial

monopolies, such as the Sugar Trust or the Standard Oil Trust, as well as do private corporations, and with more benefit to the public? The best reply seems to be that, while in all monopolies the state has far greater chances of equalling or surpassing private initiative than in competitive business, yet that there is only one class of monopolies wherein state ownership (using "state" to cover all forms of politically organized society) is at an especial advantage from the start. That is, such enterprises of a monopolistic nature, as from their nature, *must be conducted under the public eye.* Such are the post office, railroads, telegraphs, the express business, telephones, water works, gas and electric lighting and street transportation.

It is not here maintained by any means that public ownership should be soon or perhaps at all had in every one of the above kinds of business, but only that along these lines public ownership is most likely to succeed. It would be difficult, and, indeed, well nigh impossible, for the public to prevent great abuses in a public-owned cotton mill or sugar factory, whose operations can be known to but few. On the other hand, poor light or poor telegraphic service is patent to every one, and sure to be visited with such public condemnation as to secure as rapid improvement as the people want or are willing to pay for.

II. Public ownership of natural monopolies, like gas and water works, whose very nature compels them, if in private hands, to be in politics, is likely to diminish political corruption. The experience of Richmond, Wheeling, Bellefontaine, and all the other cities described in the previous pages, not excepting Philadelphia, proves this. In all those cities the

assertion of Dr. Ely is confirmed, that "The door to civil service reform is industrial reform." The tendency of public ownership in every city investigated is, I find, to a gradual separation of politics and patronage from the gas and other departments. No observant citizen can be ignorant of the corrupting influence on politics of local monopolies in private hands. The temptation to bribe councils and legislative bodies, or to control primaries and elections, is almost irresistible. A lawyer of deserved prominence and high character in Tennessee, who has been the attorney of a large gas company for years, informed the writer that not a year had passed, since he has known anything about it, when his company had not felt itself forced to direct bribery of the city council to secure favors, or more often to protect itself from unscrupulous raids. The superintendent of a large gas company in another state told me that, while his company had not thus resorted to bribery, it would undoubtedly do so in self-defense if its interests were seriously menaced.

Historians now commend Jackson for his intuitive discernment of the dangers to politics of a great bank dependent on legislation for its continuance. A similar and more threatening danger confronts us from the power of these local monopolies in private hands. A well-known president of one of the largest gas companies in the West has informed a friend of mine that he was asked a bribe of $5,000 on the very floor of the city council by one of the members. A stockholder in another gas company tells me that his company pays annually two per cent. on its capital as a bribe to members of the city council to ward off raids. Few people have any conception of the

menace to the purity of our city governments from the existence in private hands of monopolies, like light and transportation, which are of such a public character as inevitably to be "in politics," seeking for grants of franchise, etc., all the time. The occasional change of some of the employees of gas works in public hands for political reasons, an evil which does not exist at all in many public gas works and which is decreasing, as our investigation proves, in all the others, is nothing in comparison with the corruption now existing in a large proportion of the cities where gas works are in private hands.

Even though public works did not, as they do, show a considerable financial superiority for the gas consumers or tax-payers over private companies, I believe that public ownership of lighting plants, at least, should be favored as a means of somewhat purifying politics. Whether for this or other reasons street transportation should be assumed, as recently in Toronto, Canada, in the case of the Brooklyn bridge, N. Y., and in many places in Europe and Australia, cannot here be discussed.

III. A third reason for city ownership is the greater inducement thereby presented to public-spirited or able citizens to take a part in politics. When important enterprises are entrusted to public officials who can be held strictly accountable by a proper organization of administration, which would concentrate power and responsibility in a few heads of departments, public office will become a worthier and more tempting object of ambition to our best citizens. This is self-evident. The small amount of power lodged in our chief public functionaries is

largely responsible for the refusal of our ablest and best men to hold public office.

IV. A fourth interesting point of theory is the claim that city ownership of gas works is paternalism and socialism, or some other supposably dire "ism." It may be sufficient to quote, in reply to this, from a paper which, whatever its faults, is nothing if not a champion of individualism—the *Standard*, the organ of that extreme individualist, Henry George. Quoting with approval the message of Mayor Sargent, of New Haven, in favor of city ownership of gas, electric light and water works and street railways, elsewhere given in part, it is observed:

"Few editorial writers on the daily press recognize any difference between the resumption by government of public duties too long delegated to private persons or corporations, and the assumption by government of private business functions which properly belong to individuals," * * * [The former] "is not socialism, but the recognition of a truth, the obscurity of which has made the growth of socialistic ideas in this country possible. The confusion of that which of right belongs to all with that which of right belongs to the individual, has obliterated the line that divides public rights and duties from private rights and duties, and socialistic ideas are the natural result. Persons accustomed to seeing governmental powers used by private persons for their individual rights, not unnaturally look to paternalism—the usurpation of private rights and the performance of private duties by government—as the remedy for abuses arising from improperly delegating to a few powers belonging to all."

The following words from a recent editorial in a New York journal well embody the common delusion:

"There is as much reason for a government monopoly in the production of any article of general consumption as for a municipal gas or electricity monopoly. We have no objections to the people of Massachusetts having cheap gas and electricity, but as earnest believers in democracy and in the limitation of all government to strictly necessary functions, we are unable to hope for the successful operation of the municipal lighting act. Better are big gas bills than an overgrown and intolerant government."

All this is based on an entirely false but altogether too common view of the case. In reality, municipal ownership of a natural monopoly has no logical connection whatever with public entrance into competitive industry, such as cloth or bread manufacture. Though competition is often wasteful, and often needs state regulation in the matter of child labor and sanitary conditions in workshop or factory, yet it does roughly and in the long run force down prices of all classes of goods wherein real competition enters, until those prices correspond to the difficulties of production. In monopolies, on the contrary, the price does not tend to fall to any such just point, but remains the highest that the commodity or service will bear; *i. e.* it remains at that point which will secure the largest margin between the total cost and total sales.

The monopoly profit resulting therefrom, and which is the excess profit over the average returns for equal capital, labor and risk in competitive business, is in the nature of a tax levied by private parties upon the public according to its ability to pay. But every one recognizes that government alone should be entrusted with the taxing power, for it alone can be sufficiently controlled by the people to prevent any great abuse. Government must stop the application of the just principle of taxation, contribution according to ability to pay, at precisely that point where it can satisfy its necessary needs. A monopoly in private hands, acting according to the ordinary principles of self-interest, will continue to tax by high charges long past the point where it can satisfy its necessary needs, and will stop only when it cannot go any farther, *i. e.*, at the point where further increase of

charge diminishes net profit by largely lessening consumption. Government regulation being thus necessary in the interest of justice, it is a mere matter of expediency, to be determined by a study of experience, whether this can be best done by public ownership of the monopoly or by the supervision of a public commission.

As for the claim that public ownership is opposed to true democracy, it may be replied that the essence of despotism is power without responsibility to the people, whether found in the beaurocracy of the Czar or the board of directors of a private gas or railroad company uncontrolled by the people. Power with responsibility to the people, such as Jefferson would endorse, can be found in a monopoly only when controlled or owned by society. The following paragraph from Professor Ely will apply as well to gas lighting as telegraphy.

"Some cry 'paternalism' when government telegraphy is mentioned. This word 'paternalism' has become a prize bogey with which to frighten the unthinking. The state is not something above us, doing something for us. It is one kind of coöperation. It shows greater self-reliance to provide a telegraph service for ourselves than to say that 'we are so dishonest and inefficient in government methods that we dare not trust ourselves. Will not some rich men kindly provide us with a good telegraph system, and please give us cheap rates?' It has always seemed to me that those who call government enterprise 'paternalism' have never become real Americans. It is beginning to be seen that such designation is unscientific. The English economist, Professor Sidgwick, of Cambridge, styles public enterprises, like the telegraph and municipal gas works, an extension of the principle of individualism, and not socialism at all."

V. The argument that cities can manage gas works successfully because they have succeeded with water works, has been frequently made and has force. The delivery of gas is certainly as simple as the

delivery of water. The manufacture requires but one expert superintendent and a few day laborers. The entire labor cost for both manufacture and delivery, it will be noticed, was only 26.4 to 47 cents per thousand feet of gas, or, if we take the highest figure, $23,600 for 50,000,000 feet of gas, such as might be used in a population of 20,000, and this would mean only about forty employees. Probably thirty employees would suffice. Surely such a number is not enough to terrify anybody. But if there is suspicion of city manufacture, it is entirely feasible to have the gas made by a private company and let the city simply deliver, as is done in the case of a part of the gas used in Philadelphia. Good contracts of this kind can, as explained on another page, be made with a private company, for the mere manufacture of the gas is subject to some competition. Yet city manufacture will generally be found more satisfactory.

As for the success of city ownership of water works, any skeptic is referred to the report of the commissioners on sources of water supply for the city of Syracuse, N. Y., made February 1, 1889, wherein, from a thorough study of the statistics of 252 public and private companies in the United States, it is found that private water works in 129 towns charge 37.3 per cent. more than public works in 123 towns. The cost of the erection and maintenance and operation of water works, with the inclusion of interest, was found to be about the same in public and private companies, but there is so much more water used, and by more consumers in the former, that the rate per gallon or per pint is much less. The average yearly rate for a house containing one bath room, two water closets, four wash stands three

taps or six extra faucets was $18.20 per year in the 129 towns where the water works were owned by the public, and $25.00 in the 123 towns examined where the water works were owned by private companies. Yet, says this significant report:

"The experience of most towns having a water supply is that the revenue from the consumers, even at the rates so much less than are charged by water companies, is sufficient to pay off the indebtedness incurred for the construction of the works, and build all required extensions, and in many cases be a source of revenue to the city."

According to statistics compiled by Professor Sinclair,[1] from the "Manual of American Water Works," it appears that of the 1,960 water works in the United States 818, or 41.7 per cent. are owned by towns and cities, and 57.8 per cent. of the 83 in Canada. As most of the cities in the United States having over ten thousand inhabitants owned their works, more than half the urban population is served by public corporations. "The average total family rate for 318 public works," says our authority, "is $21.55 per year, and of 430 private works $30.80 per year, so that the private charge is 43 per cent. more than the public charge." In the United States, exclusive of the Pacific states, where special expenses for irrigation have to be met, "the cost of private works per family was 3½ per cent. less and they charge 31½ per cent. more than public."

The private companies cannot allege that they alone have to pay interest, for the public works pay 5 per cent. interest on a debt which is still 90 per cent. of their cost. Cities often also get a surplus revenue from their water works, besides free street sprinkling and fire supply. The latter two items

[1] "Municipal Monopolies."

average, when bought of private companies, 2½ per cent. of the cost of the works. As Professor Sinclair declares, "The tremendous advantage of public over private works, regarding their cost and the prices charged, is evident from the figures just given." With such proved success in the matter of public water works, it is certainly fair to suppose corresponding success in gas works, such as the experience of the nine cities now managing such works in the United States confirms. Another proof of the superiority of public water works over private is furnished by "Census Bulletin No. 100" of July 22, 1891, which shows that the cost of water per capita in 133 cities owning their works and having a population of 3,708,994 was $19.50, while it was $23.43 in the 112 cities with a population of 2,351,574 where the water works are in private hands.

The experience of a large number of cities with public ownership of electric lights must be considered a success, in view of the rapid growth in the number of such cities, and may be taken as another proof of the ability of municipalities to wisely undertake the management of natural monopolies.

Let us take a single example of the results of city ownership of electric lights, selected not at all because of any superior success, but solely because in the course of a journey while correcting the proof of this monograph it became convenient to stop at the place in question—Dunkirk, N. Y.—and the opportunity of studying the results of city ownership was improved.

It was found that Dunkirk with a population of about 11,000, has 60 arc lights of 2,000 candle power, which cost, exclusive of the interest of 3 per cent. on the cost, $13,000, only 1.44 cents per light per hour,

or adding interest, only 1.65 cents, or $51.38 per year. According to "Census Bulletin No. 100," Buffalo, forty miles away, pays $155.13, Cleveland $201.83, Boston $237.25, Philadelphia $177.03, Baltimore $146, New York $121.55, while Chicago, the only one of the above in which part of the electric light is supplied by the city, pays only 268, Now why does it cost Dunkirk only $51.38? It is not because of short hours, as the average number of hours of illumination in the fiscal year ending in February, 1891, was 8.53. Neither was it due to inferior light. Rather was the candle power unusually high. It does not seem reasonable that it could be due to the small size of the city, for a lineman will look after 100 lamps in Buffalo and in Dunkirk has only 60. There are other economies also in large works over small ones, though not to such an extent probably as with gas. To be sure no allowance is made here for depreciation of plant and none need be, for the works, by reason of frequent improvements which are charged to expense of manufacture are actually worth more at the end of the year than at the beginning. For the same reason deprciation is not allowed for in the nine public gas plants; all the improvements and extensions which are included in running expenses fully equal the depreciation.

The secrets of the low cost to the people of Dunkirk are the low rate of interest (3 per cent.) on real cost instead of 7 to 15 per cent. on watered stock, and second the combination of the electric light with the water department, so that the same engineers and firemen can work the engines of both departments. The electric light department, as the more recent, is charged only the increased cost which it entails.

Both of these advantages are legitimate ones of all city ownership.

VI. In connection with the management of public works like the one discussed in this monograph, the question arises, Should the attempt be made to derive a revenue and thus reduce the tax levy, or should the article produced be sold at cost? Policies differ in this respect. Philadelphia is conspicuous for its adoption of the first method. Gas consumers not only pay for the large amount of gas burnt on the streets and in public buildings, but turn into the city treasury nearly $1,000,000 in cash yearly. Otherwise gas could be sold for less than one dollar a thousand.

This policy has been severely denounced by some as a species of unfair taxation on consumption. While myself inclined to favor the sale of gas at only a trifle above cost, in order to extend its benefits for fuel as well as light, among as large a number of people as possible, I fail to see as grave objections to the opposite policy as do some. A high charge, like $1.50 in Philadelphia, is not a tax on the consumption of the poor, but of the rich and middle classes somewhat in proportion to style of living, for the poor use little gas, and the very poor none. The question, like that of any other kind of taxation, is merely a question as to what form of raising public revenue will best advance the weal of the community.

Now, Philadelphia is peculiarly situated. A larger proportion of its citizens own their homes and pay direct taxes than in any other large city in the Union. They are too conservative, too loth to approve taxes that will vastly improve the streets, schools, etc., of the city. The constitutional limit of debt having been reached, income from public-owned

monopolies is almost necessary until ideas of taxation are greatly changed. But in view of the rapid awakening of late in favor of a great change for the better in taxation, whether by income taxes, as Professor Seligman, and many others favor, or by progressive inheritance taxes, that, according to Dilke, work so well in Australia and are being cautiously introduced in New York, or by special taxes on some natural monopolies, such as land and railroads, in some way it is to be hoped that cities may be enabled to dispense with the present necessity, for revenue purposes, of charging much more than cost for gas.[1]

The recent Massachusetts law forbids a profit of over 8 per cent. after payment of interest not exceeding 5 per cent. on the debt, and after providing for the requirements of a sinking fund to cancel the debt within thirty years, and also after deduction of 5 per cent. on the capital for depreciation. The allowance of the latter item, however, is unnecessary, in case the municipality keeps the works in repair and gradually extends them out of the yearly revenue.

Prospects of an Increase of City Ownership.

On many sides come evidences of the growing favor in which public ownership of natural monopolies is held. Most noteworthy is the message for 1891 of Mayor Joseph B. Sargent, of New Haven, one of the largest manufacturers and most practical men in the country. What he says is so important,

[1] See my article "What Shall be Taxed," in the *Chautauquan*, of August, 1891.

and has attracted such wide attention, as to justify extended quotation. He says:

"In connection with the removal of obstructions to the normal growth of the city, and as absolutely necessary aids in all efforts to promote its rapid growth, are the means of safe, rapid and cheap local passenger transportation, the lighting of streets and parks and public and private buildings by gas or electricity, and the distribution of a plenty of good water for public, manufacturing and domestic use. They are all very important factors in the welfare of the people and growth of the city. * * * *

"I believe that all works of a public nature, carried on mainly within the bounds of a municipality, and for the purpose of supplying the inhabitants with certain daily requirements of civilized city life, and requiring special rights of eminent domain to distribute their products, should be owned and operated by the people, and in the sole interest of the people.

"The necessities and activities of modern business and social life in cities, absolutely require the use of the product of such works. No inhabitant is secure in health who habitually drinks water taken from the ground on which a populous city stands. No man, no city, can keep up with the front rank in the industries and proper social pleasures of city life, and not make use of the best known means of local and rapid transportation.

"The distribution of light by gas through pipes, or by electricity on wires, for private use, is almost a positive necessity in business and social life, and its wide distribution, and plenty of it, in the streets, is not only a public necessity as to travel, but a great protection against immorality and crime. So necessary are the products and services of all these works to the people, that the owners of them enjoy a practical monopoly beyond, and secure against, any competition. A new corporation invariably joins with the old, and the thumb-screws of the doubled monopoly are turned up tighter.

"The advantages of the ownership of such works by the people, and of their operation by the people through their municipal agents, would be many, and they are obvious. Among them are the following: The profits would go to the people themselves, the only customers of the works, to be used in the payment of the indebtedness incurred in procuring the works, or in reducing the price of the product. The service would be better and the product would be better if owned by, and subject to the constant inspection and criticisms of an intelligent and exacting people. Inefficacious, sluggish and inadequate methods of production or of service would

not be tolerated under ownership by the people of New Haven. The use of all streets for purposes of travel, whether on foot, by carriage or by street cars; the placing and maintaining on streets and on public or private buildings or yards the wires and poles of the works that distribute electricity; the excavations in the streets for, and the laying of water, gas, steam and sewer pipes, and the selection and laying of street car rails would be under the control and supervision of officials responsible to the people. Instead of retarding the normal growth and extension of the city by the tardy, lagging and unwilling extension of street rail-car tracks, and the too infrequent use of what are already laid, and by the refusal to extend underground supply mains into localities not immediately productive of large profit, as is now the case, if all these public works were owned by the people and operated through their chosen or appointed agents, extensions would be made equal to, or in proper advance of the immediate and urgent requirements of growth, thus leading instead of retarding the progress of buildings and population.

"Under city ownership of all the street railroads, all would be extended and connected as the public interests would require, more streets would be provided for, belt lines would be established, more frequent and faster service would be made, and all would be run in harmony under the same direction and control.

"Besides, the too frequent meddling in city and town politics by corporation officials and their favored and paid agents to control elections in the interest of the corporation, and adverse to the interests of the people, and the vicious and iniquitous use of money and favors in order to gain that end, would cease by the removal of one of the most efficient and constant promoters of impurity in our local elections.

"The objections most usually urged by interested parties against the ownership and operation of such works by the people are two. The first is that the capital necessary to build or buy such works must be raised by taxation or borrowed; to which an answer may be made that, in case of the ownership of the New Haven works, the same capital that is now invested might be gladly lent to the city, or other capital can be easily obtained on city bonds, at low interest and distant maturity, which the profits of the works would entirely pay, with interest, in less than a generation.

"The other objection alleged is probable bad management and dishonest officials. But the public taxes are assessed, collected and expended as honestly and sagaciously as private business is done. The great postoffice department, with all its immense work and its array of officials and clerks is as efficiently, economically and hon-

estly conducted as in private business. More and greater financial dishonesty appears in banks and other private moneyed institutions, in proportion to work done, than in public service. And, in fact, notwithstanding all the croakings and lamentations of the ignorant good, public business is as well managed in New Haven as the average private business, and with the growing intelligence and the greater interest of the great body of the people, no fear of serious bad management or official dishonesty need be entertained in the carrying on of public works in the interest of the customers and by the customers' agents.

"In accordance with a reservation in all the acts of incorporation by which the public incorporators now owning and operating the public works hereinbefore alluded to were established, their franchises may be resumed at any time by the people through legislative action, and the same franchises may be conferred upon the people and city of New Haven without cost, and the property of those incorporators taken at its actual value as property, divested of its present commercial value as a monopoly, and the works carried on without interruption."

Likewise Mayor Cregier, of Chicago, in his annual message avowed his endorsement of public lighting and street transportation. As has been stated, several towns and cities in Massachusetts are almost certain to begin public ownership within three years. And not only will they furnish light, but in all probability heat and power, for the gas made by the municipalities will be used in gas stoves and the electricity may be used for power in driving some machinery. Although the recent act of the legislature only specifies light, the other two services, heat and power, are so intimately connected therewith that they will either be allowed by the courts or granted by the legislature.

Mr. Theodore Horstman, city solicitor of Cincinnati, so strongly championed public ownership of the gas works there in 1890, that, according to his statement, and that of other good citizens of Cincinnati,

the gas works tried hard to defeat his re-election, but he won by an unusually large majority and one much above the rest of the ticket. The result he attributes largely to the popularity of his views on the gas question. In an official report to the board of public improvement, Mr. Horstman quotes the president of the Cincinnati Gas Company as saying that it has an annual consumption of 800,000,000 cubic feet and furnishes gas at an average price of $1.08. As its capital stock is $6,500,000 it is capitalized for $8 per thousand feet. To judge from Philadelphia $3 to $3.50 would be ample capitalization for so large an output. The company, according to the solicitor, declares 10 per cent. annual dividends on this capital or $650,000 or 80 cents per thousand feet.

Mr. Horstman continues:

"It is common knowledge that the net earnings are about $100,000 annually more than the dividends declared, and that this is put into the reserve fund and from time to time distributed to stockholders under the guise of increased capital stock. It is known that the outlay of the company for the suppression and buying out competition,—'raiders,' as the president terms them—for the occasional publication of an edition of all the daily pupers, attorney's fees, etc., etc., are enormous. It is probably true also, as the president says, 'that no company in the world has been more generous in the way of public charity.' Who pays for that?"

If $750,000 is made annually this is 75 cents on 1,000,000,000 out-put, or 93 cents on 800,000,000 feet. Eight per cent. profit on $4 capitalization would be 32 cents. Public ownership would therefore apparently reduce the price fully 43 cents below $1.08 or to 65 cents. If the output is only 800,000,000 feet, as the gas company has repeatedly declared for Cincinnati, although 1,000,000,000 feet is given in "Brown's Directory of American Gas Companies," and

if only 32 cents ought to go to capital, then capital which appears to be getting 93 cents, is getting 50 cents too much, and could make a good profit by selling for 58 cents. This seems very likely when it is remembered that Wheeling, with far less population and a poorer market for residuals, which much more than equalizes any small difference in the cost of coal, makes for 67 cents, and Hamilton, during the past six months for 72 cents, after deducting 8 per cent. for interest and sinking fund.

The present decade will probably see the doubling of the number of city owned gas plants in this country. It will surprise many to learn that as many as one hundred municipalities already own their electric light plants in this country, and the number is increasing yearly. Only a few places have yet discovered that there is much more money to be made in gas than in electric lighting. Yet such is the fact, as remarked to the writer by a member of the Massachusetts gas commission, and by the editor of one of our gas and electric light journals. This is probably because the use of gas is more general, and its manufacture and distribution, especially the latter, are a more complete monopoly than is electricity. Wires of temporarily competing companies, however annoying and dangerous to the public, can be more easily strung and are less annoying than the tearing up of the streets for rival gas mains. What money there is in electric lighting, however, can be best secured by cities which run the lights in connection with the water works department with much saving in salaries, wages, and even buildings.

When this great profit in gas and the certainty that, so far from being displaced by electricity, gas

is greatly helped thereby, as shown on a previous page, is understood, and when the real success thus far of city ownership in this country is once generally known, a rapid increase in the number of such municipal works is sure to come.

APPENDIX A.

History of the Philadelphia Gas Trust.

BY W. S. OUTERBRIDGE, JR., OF PHILADELPHIA.

The history of the gas supply in Philadelphia begins with the date of March 21, 1835, when a stock company for the manufacture and supply of gas was created by an ordinance of the city councils, with 1,000 shares of 100 each. This action was the result of an agitation by the progressive portion of the community in favor of gas lighting.

After nineteen years' successful demonstration of the practical application of gas to purposes of illumination, and after a standing committee of the councils had for nine years, again and again, reported in favor of the system, the common council, on January 27, 1835, failed to pass the desired ordinance. This failure roused the advocates of the introduction of gas lighting to more determined efforts. Petitions and remonstrances poured in upon the councils without cessation, and the members of that body soon began to see that their steady resistance to the introduction of the contemplated improvement was rapidly developing a strong, indignant, popular feeling. Upon fully appreciating this fact, the councils abandoned all objections, except that the expense was greater than the city could afford. By the expedient of borrowing, however, means were soon

found to overcome this objection to an outright expenditure of money.

Accordingly on March 21, 1885, the proposed ordinance was successful. The 1,000 shares at $100 each were to be entitled to a *pro rata* proportion of the profits which might arise from the works. The receipts, after the cost of the manufacture of gas, with charge for rent of lot and property, cost of repairs and incidental expenses, were to constitute these profits. Dividends were to be declared half yearly. What gain was to be made or what profit earned could only be extremely indefinite, but there was sufficient confidence that the works would pay to induce a liberal subscription. Careful provision was made to the effect that the city of Philadelphia, if it was deemed expedient, might at any time take possession of the works and convert the stock into a loan, redeemable in twenty years from the date of such action. Interest of six per cent. per annum, payable semi-annually, was to be paid after such transfer was made.

The city, even as it was, retained a sort of quasi-guardianship over the works and, for their control, provided that the select and common council should each select six trustees to form a board of management. Three classes were at first to be formed from this board, for different periods of service—namely, one, two and three years. After the last period each council was to elect annually two persons to serve for three years. In anticipation of attempted abuse of power, it was directed that at no time should more than two members of each council be permitted to hold office as trustees. The rest of the twelve trustees were selected from the stockholders by the coun-

cils. The trustees were to begin at once the erection of works for the manufacture of "carburetted hydrogen gas from bituminous coal." Pipes were to be laid for both public and private illumination. The daily manufacturing capacity was not to be less than 75,000 feet. It was provided that public lamps, numbering not more than 300, should be supplied at one-half the charge made to private consumers. Fixtures and meters were to be furnished without cost. The money received from all sales of gas was to go into the city treasury, and warrants against this fund were to be drawn by the mayor on requisition from the trustees. For the location of the gas works, the lot of ground between Twenty-second street and the Schuylkill river and Market and Filbert streets was appropriated, at a rent of $500 per annum.

When in October, 1835, the trustees published the terms upon which they would furnish gas to citizens they fixed the price at $3.50 per 1,000 cubic feet, with a discount of 5 per cent. allowed on all bills paid at their office within three days after presentation. The trustees worked industriously to carry out the ordinances and soon erected the necessary buildings, retorts, gas holders, work shops and office, lime and purifying house, two gasometers, with tanks of masonry, etc. The iron gasometers had each a capacity of 34,000 cubic feet of gas, while the retorts were able to manufacture gas sufficient for 24,000 argand burners. By the beginning of January, 1836, pipes had been laid to the extent of 38,652 feet, exclusive of 1,500 feet of branches and service pipe for consumers. It was found by December, 1835, that $100,000 was not enough to pay for all the improvements and necessary expenses. An addi-

tional issue of stock to the amount of $25,000 was therefore authorized and was quickly subscribed for. The report of the trustees at the beginning of 1837 showed that there had been a steady increase in the consumption of gas up to that time, the daily amount consumed being 42,000 cubic feet, supplied to 28 private consumers and 165 public burners. Receipts from private consumers during the year 1836 amounted to $13,727.13 (from the same source 1890, $3,377,251.77). The sale of coke, together with coal tar, etc., amounted to $2,507.53 (from same source 1890, $275,714.09).

The increase of capital, as authorized in the $25,000 loan before spoken of, was used in making additional improvements, extensions, etc. That these things were needed is shown by the fact that 17,078,700 cubic feet of gas was manufactured in 1837, as against 6,481,300 cubic feet in the eleven months of 1836. At the same time the number of private consumers had reached 670, while 301 public lamps were supplied. One of the later reports of the gas trust speaks of the establishment of the works as follows:

"The Philadelphia gas works were commenced in 1835, on a smaller scale than would now be required for a village. In the following year $150,000 was borrowed to enlarge the works, to the payment of which the credit of the city was pledged. Two years afterward the consumption of gas had more than quadrupled, and a second loan of $200,000 was made. From this time until 1851 various loans of comparatively small amount were obtained for the extension and enlargement of the works, aggregating $1,370,000. During this interval the consumption of gas had become over thirty times as great as it was in 1836."

Several private companies, entirely independent, had been constructed prior to the consolidation of 1854, when they were bought up by the board of trustees. The first of these private works was the

Northern Liberties Gas Works, established in 1838 and incorporated as the Northern Liberties Gas Company in 1844. Following this company was the Spring Garden Gas Company, incorporated under the act of April 27, 1844. The Richmond Gas Company was incorporated in 1847. The Southwark and Moyamensing Gas Company was given authority to manufacture gas during the early part of 1848. Some dissatisfaction arising from the actions of this company, complaint was made accordingly, and by the act of May 1, 1852, power was given to the commissioners of the district of Southwark to erect gas works, manufacture gas for the use of the district public lamps, and to sell the same to private consumers. These privileges were never exercised, as the consolidation measures, coming so soon after, did away with their necessity. The Germantown Gas Company was incorporated in 1851. The West Philadelphia Gas Company was fully established and put upon a working basis on March 18, 1852. On April 20, 1853, the Manayunk Gas Company was incorporated, while in Frankford the borough authorities had created a small establishment for the manufacture of gas, which was in operation at the time of consolidation.

In the meantime, 1838 to 1853, affairs between the stockholders of the city gas works and city councils had not been progressing so smoothly as was desirable. The reason for this is apparent—the stockholders supplied the money and the councils wanted the control. Under such conditions harmony was impossible. Such of the trustees as were stockholders felt that those who paid the money should have control. The others contended for the city's right. Discus-

sions became very hot. Every time new loans were asked for, when necessary extensions were to be made, the councils would extort some new concession. As quarrel after quarrel came in rapid succession, they became more and more violent, and correspondingly increased in importance. The culmination was reached January 14, 1841, when an ordinance was passed by which the councils exacted—

"First. The absolute control of the sinking fund for the redemption of bonds, and the right to limit the dividends to a lower rate than had previously been declared.

"Second. Requiring the trust to pay $1,000 each year for ten years into the city sinking fund.

"Third. Ditches opened for laying mains to be repaired by the city commissioners at the cost of the trust.

"Fourth. Requiring the stockholders to accept the provisions of this ordinance and so certify to the councils before the 25th day of February, and in case of failure to so accept, the councils declared that they would take possession of the works and operate them on the first day of March."

As was most probably anticipated, the stockholders refused to accept these conditions. The city then proceeded to take possession. On June 3, 1841, an ordinance was passed creating a twenty-year loan of $125,000 to pay for the works, this sum being the amount of stock that had been authorized. In this manner, then, the city of Philadelphia obtained possession of this valuable property without expending a single dollar. It is the almost universal idea that the city spent untold sums in the purchase and construction of the gas works. The idea is not in the least warranted. They have been entirely paid for out of the profits of the manufacture, barring a net debt at present of $1,300,000. Consumers have paid for the gas and also for the works. The ordinance under which possession was thus taken directed that "the

works should be controlled and managed by a board of trustees, elected and constituted as heretofore, who shall have the whole control and management of the works and of the sinking fund, and of all other funds belonging to said works, and said trustees shall pay no part of said funds, nor any part of said profits of said works into the city treasury." Without bond and with accountability reduced to a minimum, the gas works were by this action put into the hands of politicians.

Trouble continued, however, and the struggle went on along the line of obtaining for the councils the direct management. February 29, 1844, a joint committee of the councils was appointed to confer with the board of trustees relating to a reduction in the price of gas. The question as to what constituted the cost of making gas received considerable attention, but no satisfactory conclusion was arrived at. It depends to a large extent upon the classification of the large items, and while the trustees counted some of these as "cost of manufacture" others classified them as "investments."

During 1854 matters between the trustees and councils became so bad that they took the form of open rupture if not, indeed, actual warfare. The councils, in an attempt to seize the property and effects of the gas works, appointed a committee for that purpose. By a proclamation of the mayor it was attempted also to cause all moneys to be paid directly into the city treasury.

The trustees offered considerable resistance to these things, and took out at first a temporary injunction which, when finally carried into the supreme court, was made perpetual. Judge Lewis declared

that the city councils had no right to interfere with the works or their management. This decision put at rest all question as to the existence of the trust. It made the life of the trust an assured fact until the last bond issued for the gas works should be redeemed.

By act of the legislature of March 22, 1855, the trustees and committee on gas were directed "to assess the entire value of the gas works of the late districts of Spring Garden, Moyamensing, West Philadelphia and the late borough of Frankford, at their fair value, not to be less than the sum of $450,000." Among other requirements of the act, the trustees were authorized to negotiate for the purchase of the properties of the Northern Liberties Gas Company, Southwark and Moyamensing Gas Company, Kensington Gas Company, Richmond Gas Company and Germantown Gas Company. The stockholders of these various companies were anxious to make the best of their speculations. They had the right to operate, and therefore asked large sums for selling their privileges. The Northern Liberties Gas Company was to be paid $360,000, but the sale was never completed, and the establishment of this company is even till now the only agency manufacturing gas for public and private lighting, which is not under control of the city of Philadelphia. The Southwark and Moyamensing Company secured $109,000. The Kensington Gas Company was sold for $90,000, a sum much larger than the stockholders had invested. The Richmond Gas Company gave up its rights for the more reasonable price, $16,500. The Manayunk Gas Company was given

$65,000 in return for their works. The Germantown Gas Company sold out completely for $85,000.

The first investigation of the trust for personal wrong doing, or for misuse of money, seems to have been made in 1857 by a committee. This committee reported that since the year 1854 (to which time the investigations had been limited) the trustees—

"Expended money for refreshments, though to a limited extent, a few hundred dollars a year. Such an expenditure of public money, no matter how trifling in amount, your committee most unqualifiedly condemn. Its tendency is to extravagance, and the improper use of trust funds. The trustees have agreed, from a public spirit we presume, to serve their fellow-citizens in this trust gratuitously, and they should, to the fullest extent, do so. It is not an argument in favor of such practices that they receive no compensation for their services; they assumed their duties voluntarily, knowing there was no reward save the consciousness of having faithfully discharged the trust confided to them. If they are entitled to compensation, a few cigars or a glass of liquor now and then, or an occasional dinner, we think but slender pay. . . . . These practices, however, have age, if not propriety, on their side. It is to be hoped that they have had their day, as they are now in direct violation of the statute law of the state, and that they will be heard of no more."

In 1858 the politics of the city were Democratic. The trust was composed of six Democratic and six Republican trustees. To obtain a Democratic majority an act of assembly, dated April 21, 1858, was secured. This act authorized the election of six additional trustees. A case was made up, and the supreme court declared the law unconstitutional, reaffirming the opinion of the court in 1854.

By 1860 things were little or no better, investigations were again the order of the day and a determined effort was made to find out "from what cause (if it can be ascertained), the bills of consumers of gas have been of late so largely increased, whether

from defective meters or from inferior quality of gas furnished, or from other causes." The report of the committee appointed stated, however, that out of 11,114 consumers only 3,259 were found to have bills in excess of the previous year. This cry of bills largely disproportionate to the consumption has almost been a continuous one. Gas companies always assert the infallibility of their meters. They prove the correctness of the bills by referring to the meter, and show the accuracy of the meter by referring to the bills. This practice has led to a rather cutting editorial remark upon its use. "The companies, as everybody knows, invariably appeal to the meter, declaring that its registration is infallible; that the meter won't lie, which, if it were true, would show its measureless moral superiority to any gas company." Some additional investigation was made during this year (1860), which resulted in an alleged discovery of misuse of funds, but not of any sufficient amount to result in any action of importance.

In 1868 the councils made still another attempt to obtain control of the works, since which time until 1880 a whole series of investigations were made. One of these cost $10,000. During the year 1880 suit was commenced by the city against the gas trust in equity. This brings us down to the period ending with the overthrow of the trust and the inauguration of the present system. The suit resulted from the report of a special committee of the councils that there was gross maladministration of the gas trusts.

The Committee of One Hundred, composed of public-spirited citizens belonging to both parties, without respect to either, was organized because of popular dissatisfaction with the prevailing condition of affairs.

At the request of the city solicitor, the committee retained counsel to assist in the prosecution. In their report the committee say:

"At the outset difficulties were encountered, which only yielded to the persistent efforts of counsel. Little was known of this trust. Its meetings had for years been held in secret, while its published annual report to the councils was confused and unintelligible, and, as now appears by the evidence, actually falsified. The visible results of the management of the trustees had been the sale of gas at a high price to Philadelphia consumers without realizing an adequate profit to the city. The vast purchases of supplies, made at excessive prices from favored parties, without competition or advertisement (in some instances from the trustees themselves, in violation of the ordinance), the disbursement of enormous sums annually for these purchases in checks drawn to bearer, the frequent failure to produce any record of the supplies having been received or the work performed, the admission that, not content with paying bills rendered, the employees in some cases habitually made out the bills themselves, make some of the general features of the management of this municipal trust, as appearing in the very voluminous testimony."

It is not necessary to go into the particulars of this testimony, as nothing of importance would be gained. It will be sufficient to add that the counsel for the plaintiff presented a portion of a great number of bills, "showing illegal expenditures and over-payments in cash amounting to over $580,701.79, before laying before the court the manufacturing statistics of the trust, showing that so much of the invariable products of common materials, such as coal gas, coal tar, coke, etc., are unaccountably missing in the amount reported to have been produced and sold, as to involve a further loss amounting to over $2,900,000 in the six years covered by the bill in equity." The total loss, as fixed by the report, was $3,494,242.65. The suit dragged wearily along and was discontinued about the latter part of 1886. Some changes were made in 1882, due to the investigation, which mate-

rially bettered the business methods of the trust. The way was opened for competition in the purchasing of supplies about this time. This was done by public advertisement. Before the year mentioned the trust had always met its obligations by promissory notes. Permanent improvements for the extension of the works had never been made without a loan having been previously created by the councils. Persons who desired to have gas mains put down for their convenience were compelled to pay for them. A large sum was charged the city each year for lighting and maintaining the lamps. These things were after this time managed differently, due largely to the detection and punishment of those who were embezzling the cash receipts.

Following the suggestion made during this reform period that the gas works be taken out of the hands of the trustees, was a series of overtures for the purchase or lease of the works. The first was made in May, 1883. This offer was for the purchase of the works at a price of ten millions of dollars, two millions cash and the balance out of the profits. The offer was never accepted, although the bid was afterward raised to twelve millions. The bid next made was fifteen millions, after which followed a proposition to lease. The offer was to take a lease of the city gas works for twenty-five years, at a rental of one million dollars per annum in advance.

As was natural, these various propositions roused considerable feeling on the subject, and arguments for and against each of them were presented to the public in great number. The last offer, followed as it was by the change in the form of our city government, brought into existence a vast quantity of writ-

ings, intended to bring before the people both sides of the question. Prominent men favored the sale or lease, while others equally prominent strenuously opposed it.

The proposition to lease, last spoken of, viz: one million dollars a year rental for twenty-five years, was presented by Henry Lewis, Wharton Barker, Thomas Dolan and George Philler. Beside the offer from these gentlemen was another from the United Gas Improvement Company. The former, however, seems to have provoked the most discussion. It was understood from Mr. Dolan that, should the other bids be entertained, his would be withdrawn. Notwithstanding this, however, the influence of public opinion induced the finance committee to listen to other offers. Thereupon Messrs. Bower, Wanamaker, McLaughlin and Harrah introduced their bids. An editorial of that period says that all of these bids were far more advantageous to the city than Mr. Dolan's.

Mr. Wanamaker's bid of $20,000,000, as was probably intended, opened many eyes to the value of the gas works to the city.[1] After long debate and endless arguments, by a vote of fifteen to nine, the councils retained the gas works for the city. Says one writer:

"By no means profitless were the prolonged debates over the lease. From them Philadelphians have learned the real value of the gas works, the profit that they can be made to yield under proper management, the bonus and rental that a lessee or lessees ought of right to pay, and the fair price of gas to consumers."

In 1885 Mr. Henry C. Lea wrote what was said to be "the people's presentation of their side of the

[1Mr. Outerbridge is right. Mr. Wanamaker confirmed it in conversation with me.—E. W. B.]

question." Contained in this pamphlet were some of the arguments for the sale of the works, together with a calculation as to the cost of erecting new works equal in all things to the old. Among these arguments were the two, most generally urged, that the gas trust was, and had been, one of the most evil features of our local politics, and that the making and furnishing of gas was no part of the duty of a municipality.

In his calculation as to the valuation of the works in 1885, Mr. Lea commences with the value as stated by the report for January of that year. This value was there said to be $11,799,593.06. By taking into consideration the real estate value, then assessed at $2,850,000 the cost of the mains, the cost of the services, the value of meters, etc., he arrived at the following conclusion:

Assessed value of real estate and improvements..	$2,850,000
Street mains, probable sale value.....	2,000,000
Services and meters, " "	925,000
Total.....	$5,775,000

This was supposed to be a reasonable approximation at the time when made.

The citizens' committee about this year also presented a pamphlet, addressed, "To the Select and Common Councils of the City of Philadelphia." It says, after speaking of the improvements in the lease obtained by the amendments:

"In several respects the public interests are still insufficiently guarded. In the first place, there is fundamental error and injustice in the principle that the price of gas is to be kept at a high figure in order that a large revenue may accrue from it."

The report concedes that it would not be so bad if the burden inflicted on gas consumers finally reached

the public treasury, but when it is to be for the benefit of the lessees until their profits reach a million of dollars a year, then the matter should be carefully considered before ultimate action is taken.

"It is easy to say in advance that under the ordinance self-interest will prevent the lessees from keeping gas at the high figure of $1.50 per 1,000, in view of the advantage to be derived from increased sales at lower prices, but experience does not show that corporations dealing with the public are inspired with this enlightened selfishness. Unfortunately, the terms of the proposed lease are such as directly to stimulate the policy of high prices and restricted consumption. All the improvements and betterments are to lapse to the city at the expiration of the lease. As the term draws to an end the policy of the lessees will necessarily be to spend on the works nothing that will not pay for itself before the end of the term. Extensions of all kinds—of mains and holders and apparatus—will be withheld. It will not be for the interest of the lessees to stimulate consumption, but to limit it to the capacity of the plant, and, having a monopoly, they can afford to do this and keep up the price. There is no provision in the ordinance compelling them to lay street mains as the built up portion of the city extends, and thus they are invested with arbitrary and despotic power to control the growth of the city and determine the directions in which it shall take place. As the lease draws to an end this power will become an unendurable fetter upon the expansion of the city. It will be useless for new streets to be laid out and built up if gas is withheld, and it will be useless to expect the lessees to lay mains which will lapse to the city before they can repay the cost of laying them."

Doubtless these disturbances relative to the management of the gas works would have continued much longer had not the Bullit bill, "An act to provide for the better government of cities of the first class in this commonwealth," gone into effect on the first Monday of April, 1887. By this act the department of public works was put under the charge of one director. The water and gas works were among the public works that came within the control of this department, and they were therefore placed under the

supervision of the director of public works. This is the present arrangement. Both politically and economically the change has been for the better. Perhaps, however, the trust was not altogether to blame for the growth of the gas ring, which made the Philadelphia gas works almost a synonym for corruption. The management has compared not unfavorably with the management of the other city departments.

Because the control of a board of trustees, made practically irresponsible, did not tend to promote the community's best interest, is no argument that good results are utterly impossible under another system. Four years' time hardly gives sufficient material for the claim that there will be no trouble in the future, but from present indications it seems probable that the argument against city ownership is being disproven, not by theory, but by actual facts.

[The above account is from Mr. W. S. Outerbridge, Jr., a graduate student under Professor E. J. James, in the School of Political Economy and Finance of the University of Pennsylvania. In adding a word, I wish especially to call attention to the fact brought out in the paper that, though the city councils elected the trustees of the gas trust for terms of three years, they had no power of investigation or control over these trustees until certain bonds were paid in July, 1886. A foot note in Bryce's "American Commonwealth" thus clearly expresses the condition of affairs:

"The trustees were constituted trustees of the loans issued for the construction and enlargement of the works. Their appointment was lodged in the hands of the city councils; but when, on more than one occasion, the councils endeavored to obtain control of the works, the courts were appealed to and decided that the board, as

trustees for the bondholders, could not be interfered with until the last of the bonds issued under this arrangement had matured and been paid off. Thirty-year loans under these conditions were issued until 1885, so that it was not until 1885 that the city was able to break within the charmed circle of the trust."

Consequently Philadelphia does not furnish an example of what is always meant by city ownership—real control by the people—until April, 1887, when, by the provisions of the famous reform law passed by the Pennsylvania legislature, and known as the Bullit bill, the city was able for the first time really to manage its gas works.

There is still a debt on the gas works, as follows:

Due January 1, 1899	$ 980,000
" " " 1900	1,020,000
" " " 1902	500,000
" " " 1905	1,000,000
Total	$3,500,000

As the sinking fund on interest for the redemption of this debt amounts to about $2,300,000, the net debt is only about $1,300,000.

Interest on this at 6 per cent.—and I believe the interest rate is less on some of these bonds—would be $78,000, leaving about $1,330,000 net profit, if we value the gas used by the city at only $1 a thousand feet. The city is evidently already doing better than if it had accepted any of the bids for lease or sale of the works.

Mr. C. W. A. Veditz, of Philadelphia and the Wharton School of the University of Pennsylvania, who began the preparation of the Philadelphia history before his sickness, thus writes June 25, 1891:

"Philadelphia now can illustrate by contrast the advantage of public management of natural monopolies. One of the most effective arguments against the sale of the gas works, was that a private

company would charge the city exorbitant rates for its public lights, whereas they were furnished free of cost by the city works. We have now here a growing electric trust, cornering all franchises and putting bills through councils every week. For its partial lighting with electricity the city now pays, I think, about $300,000. We pay twice as much for our electric lights, I understand, as most other cities, proving the truth of the above argument. The electric company in whose district I live has lately consolidated with another (made up largely of politicians), and when they all consolidate, Philadelphia will be taught a dollars-and-cents lesson in the benefits of private management. A citizen dissatisfied with his gas may have his complaints heard and attended to by city officials, who are in a measure responsible to him. Where private management obtains, as in case of electric plants, complainants are told—where there is no competing company in the district—that if they don't like the light they can take it out. Where there are several or two companies, any advantage of competition is dearly paid for when consolidation takes place."—E. W. B.]

APPENDIX B.

Massachusetts Law Authorizing Municipal Lighting.

SIGNED BY GOVERNOR RUSSELL JUNE, 1891.

An Act to enable cities and towns to manufacture and distribute gas and electricity.

SECTION 1. Any city or town may, under the limitations of this act, construct, purchase, lease or establish and maintain within its limits, one or more plants for the manufacture or distribution of gas or electricity for furnishing light for municipal use, and for the use of such of its inhabitants as may require and pay for the same as herein provided. Such plants may include suitable land, structures, easements, water privileges, stations, gasometers, boilers, engines, dynamos, tools, machinery, pipes, conduits, poles, conductors, burners, lamps and other apparatus and appliances for making, generating, distributing and using gas or electricity for lighting purposes.

SEC. 2. No city shall exercise the authority conferred in Section 1 until a vote that it is expedient to exercise such authority shall have passed each branch of its city council by a two-thirds vote and received the approval of the mayor in each of two consecutive municipal years, and thereafter have been ratified by a majority of the voters present and voting thereon at an annual municipal election. When such a vote has failed to secure such ratification, no similar vote shall be submitted for ratification until after the expiration of five years thereafter.

SEC. 3. No town shall exercise the authority conferred in Section 1 until after a vote that it is expedient to exercise such authority shall have been passed by a vote of not less than two-thirds of the voters present and voting, at each of two legal town meetings called for the purpose, of which meetings the second shall be held at an interval of not less than two or more than thirteen months after the first. At such meetings such vote shall be taken by written or

printed ballot and by the use of the check list. When such a vote has failed of passage as hereinbefore provided at the second of said meetings, no similar vote shall be passed until after the expiration of two years thereafter.

Sec. 4. Any city or town establishing or purchasing a plant within its limits, as provided in this act, or reconstructing, extending or enlarging the same, as provided in Section 5, may pay for the same by the issue of bonds, payable in a term not exceeding thirty years, and bearing interest at a rate not exceeding five per cent., which shall not be disposed of for less than par and accrued interest, and the indebtedness thereby created shall not be included in the limit of indebtedness of such city or town provided by law; but such bonds shall not be issued until a vote authorizing the same has been passed by a vote required by Section 7 of Chapter xxix of the Public Statutes, and the whole amount of bonds so issued by a city or town and outstanding shall not exceed at their par value the amount of five per cent. of the total valuation of estates therein in the case of a town, or two and one-half per cent. of such valuation in the case of a city, according to the last preceding state valuation. The interest on such bonds and a sinking fund to meet the same at maturity shall be provided for as required by Section 9 of said Chapter xxix. No indebtedness shall be incurred by any city or town in connection with such plant, except as aforesaid, and excepting further that money may be borrowed under the provisions of Section 6 of said Chapter xxix as amended, to pay the operating expenses thereof. All receipts from the sale of gas or electricity shall be paid over to the treasurer of such city or town. The gross expenses of running such plant and conducting such business of supplying gas or electric light, including interest on such bonds and requirements of the sinking fund as aforesaid, shall be included in the appropriations made annually or from time to time by such city or town, and shall be paid out of the treasury thereof.

Sec. 5. Any city or town owning a plant for the manufacture or distribution of gas or electricity may reconstruct, extend or enlarge the same, but no such reconstruction, extension or enlargement, beyond the necessary and ordinary maintenance, repair and replacement thereof, except such increased appliance for the distribution of gas and electricity as may be necessary to furnish the same to new takers, shall be undertaken or made except by the vote provided by Section 4 in the case of the issue of bonds.

Sec. 6. Any city or town obtaining a plant may provide by ordinance, if a city, or by by-laws if a town, for the equitable assessment upon the owner or occupant of any premises of any part or the whole of the cost of laying and maintaining upon such premi-

ses, pipes, conduits, conductors or other appliances for the distribution of gas or electricity to the occupants thereof. Payment of such assessments shall not be obligatory, but shall be made a condition precedent to the supply of gas or electricity to the occupants of such premises, and may be exacted before providing any such appliances for such distribution.

SEC. 7. Any city or town having obtained a plant for the purpose, as provided in this act, may manufacture, generate and distribute gas or electricity for furnishing light for municipal use or for the use of its inhabitants, under such regulations as it may establish. No city or town shall be compelled to furnish gas or electricity to any person or corporation except upon order of the gas and electric light commissioners and after payment of any assessment provided for in Section 6. Any person or corporation aggrieved by the refusal of any city or town supplying gas or electricity under the authority of this act to furnish the same may appeal to such commissioners, setting forth in such appeal what is required of the city or town in such detail as the commissioners may require.

SEC. 8. Whenever any city or town shall obtain a plant as provided in Section 1, the operation, control, management and repair thereof, manufacture, generation and distribution of gas and electricity thereby, including the purchase of supplies, the hiring and discharge of employees, and all business relating to such manufacture, generation and distribution, to the methods, amounts, times, prices and quality of the supply to each person and corporation, the collection of bills, the keeping of accounts and custody of moneys received for gas or electricity or otherwise, and the payment of bills incurred in said business, shall be entrusted, subject to any ordinances established by the city council in a city, or the by-laws or regulations established in a town, to one officer, who shall be appointed and may be removed by the mayor in a city, and by the selectmen in a town. Such officer shall be known as manager of gas, manager of electric light, or manager of gas and electric light, according as a plant for one or both may be under his charge. In cities the compensation of such officer shall be annually fixed by the city council, and in towns by the selectmen Before entering upon the duties of his office he shall give bond to the city or town for the faithful performance of his duties in such sum and form and with such sureties as the mayor and selectmen shall approve. He shall at the end of each municipal year render to the mayor or selectmen such detailed statement of his doings and of the business and financial matters in his charge as the gas and electric light commissioners may prescribe. He shall also at any time, when required by the mayor or selectmen, make to him or them a statement

of his doings, business, receipts, disbursements, balances, and of the indebtedness of the city or town in his department, in the detail required; and he shall pay over to the treasurer of the city or town all receipts collected.

SEC. 9. The books and accounts pertaining to the business authorized by this act shall be kept in a form to be prescribed by the board of gas and electric light commissioners, and the accounts shall be closed on the thirtieth day of June in each year, so that a balance sheet of that date can be taken therefrom and included in the return to said board, which return shall be for the year ending the thirtieth day of June. The mayor or selectmen and manager shall annually, on or before the second Wednesday of September in each year, make a return to said board in a form prescribed by it, setting forth the financial condition of said business, the amount of indebtedness authorized or existing on account thereof, a statement of income and expenses in such detail as the board may require, with a list of salaried officers employed in said business and the amount of salary paid to each. Said return shall be signed and sworn to by the mayor or a majority of the selectmen and in both cities and towns by the manager. The mayor of a city or the selectmen of a town may direct, in addition, any additional returns to be made that they may order at such time and in such detail as they may vote. The mayor or selectmen and manager shall also at all times, on request, submit said books and accounts for the inspection of said board, and furnish any statement or information required by the board concerning the condition, management and operation of said business.

SEC. 10. The price to be charged for gas or electricity to persons and corporations shall be fixed, and shall not be changed oftener than once in three months. Any change shall take effect on the first day of a month, and the new price adopted shall, before the change shall take effect, be advertised in some newspaper published in the city or town where the plant is, if any is published therein. Such price shall not, except with the written consent of the gas and electric light commissioners, be fixed at less than cost, in which shall be included, in addition to all operating expenses, interest on the net investment in plant made by the city or town, less assessments collected under Section 6, at the rate paid upon the bonds above provided for, together with the requirements of the sinking fund established to meet such bonds, and also depreciation of the plant, to be reckoned at not less than five per cent. per annum of its cost, and losses; but any losses exceeding three per cent. of the investment in plant may be charged in different years at no more than such three per cent. per annum.

Such price shall not be greater than shall allow above such cost a profit of eight per cent. per annum to the city or town upon its net investment. In fixing such cost to establish the price to be charged to persons and corporations the gas and electricity used by the city or town shall be charged to it at cost. A sufficient deposit to secure the payment for gas or electricity for three months may be required in advance from any taker, and the supply may be shut off from any premises until all arrearages for gas or electricity furnished thereon, to whomsoever furnished, shall be paid. After three months' default in the payment of such arrearages, all appliances for distribution belonging to the city or town on such premises may be removed, and after such removal shall not be restored except on payment of all such arrearages, and a sufficient sum to cover all expenses caused by removal and restoration.

SEC. 11. Any city operating a plant under this act may pass ordinances, and any town operating a plant under this act may, subject to the approval of the superior court, adopt by-laws imposing penalties not exceeding fifty dollars to protect its plant, control its use, prevent accidents from gas or electricity supplied by such city or town, and govern consumers in their use thereof.

SEC. 12. When any city or town shall decide, as hereinbefore provided, to establish a plant, and any person, firm or corporation shall at the time of the first vote required for such decision be engaged in the business of making, generating or distributing gas or electricity for sale for lighting purposes in such city or town, such city or town shall, if such person, firm or corporation shall elect to sell and shall comply with the provisions of this act, purchase of such person, firm or corporation, before establishing a public plant, such portion of his, their or its gas or electric plant and property suitable and used for such business in connection therewith as lies within the limits of such city or town. If in such city or town a single corporation owns or operates both a gas plant and an electric plant, such purchase shall include both of such plants, but otherwise such city or town shall only be obliged to purchase the existing gas plant or plants if it has voted only to establish a gas plant, and shall only be obliged to purchase the existing electric plant or plants if it has only voted to establish an electric plant. If the main gas works, in the case of a gas plant, or the central lighting station, in the case of an electric light plant, lie within the limits of the city or town which has voted to establish a plant as aforesaid, such city or town shall purchase, as herein provided, the whole of such plant and property used in connection therewith, lying within its limits, and the price to be paid therefor shall be its fair market value for the purposes of its use, no portion

of such plant to be estimated, however, at less than its fair market value for any other purpose, including as an element of value the earning capacity of such plant based upon the actual earnings being derived from such use at the time of the final vote of such city or town to establish a plant, and also any locations or similar rights acquired from private persons in connection therewith, plus the damages suffered by the severance of any portion of such plant lying outside of the limits of such city or town, and minus the amount of any mortgage or other encumbrance or lien to which the plant so purchased, or any part thereof, may be subject at the time of transfer of title; but such city or town may require that such plant and property be transferred to it free and clear from any mortgage or lien, unless the commissioners appointed under the provisions of Section 13 of this act shall otherwise determine. Such value shall be estimated without enhancement on account of future earning capacity, or good will, or exclusive privileges derived from rights in the public streets. When any capital has been paid in, in property instead of in cash, the valuation placed upon such property in estimating it as paid-in capital shall not be conclusive in estimating its value under the foregoing provisions, but may be disputed by a city or town, and if shown to have been excessive may be reduced by the authority fixing the price of the plant and property as hereinafter provided. If the main gas works or central lighting station of such a plant do not lie within the limits of the city or town which has voted as aforesaid, then such city or town shall only purchase that portion of such plant and property which lies within its limits, paying therefor upon the basis of value above established, but without allowance of damages on account of severance of plant. No city or town shall be obligated by this section to buy any apparatus or appliances covered by letters patent of the United States or embodying a patentable invention unless a complete right to use the same, and all other apparatus or appliances necessary for such use, within the limits of such city or town to such extent as such city or town shall reasonably require such right, shall be assigned or granted to such city or town at a cost as low as the cost of such right would be to the person, firm or corporation whose plant is purchased.

Sec. 13. Any person, firm or corporation desiring to enforce the obligation of any city or town, under Section 12, to purchase any property, shall file with the clerk of said city or town, within thirty days after the passage of the final vote whereby such city or town shall have decided to establish a plant, a detailed schedule describing such property and stating the terms of sale proposed. If the parties fail to agree as to what shall be sold, or what the terms

of sale and delivery in accordance with the provisions of this act shall be, either party may within sixty days after the filing of the schedule apply by petition to the supreme judicial court, or any justice thereof, setting forth the facts and praying an adjudication between the parties; and thereafter such court or justice shall, after giving both parties an opportunity to be heard, appoint a special commissioner or commissioners, who shall give the parties an opportunity to be heard, and shall thereafter adjudicate what property, real or personal, including rights and easements, shall be sold by the one and purchased by the other, in accordance with the provisions of this act, and what the price, time and other conditions of the sale and delivery thereof shall be. Such commissioner or commissioners shall file his or their award in the supreme judicial court for revision or confirmation by said court.

Sec. 14. Any party aggrieved by the award of the commissioner or commissioners may within fourteen days after its filing, or within such longer time as the court may allow, file objections thereto, and apply to the court for a hearing on such award relative to any matter of fact or law pertaining to the same; and thereupon the court shall order a trial to be had before said court or a justice thereof, after due notice to all parties interested in the matter of said award, in the manner of hearings in equity. The decree of the court upon said award shall be final and binding, and said court shall have jurisdiction in equity to compel compliance therewith, and may also issue and enforce such interlocutory decrees and orders as justice may require.

Sec. 15. Whenever the existing gas plant or electric plant of any person or corporation shall have been acquired by any city or town pursuant to the provisions of this act, the powers and rights of such person or corporation in relation to the manufacture and distribution of gas or electricity within the limits of such city or town shall, from and after the date of such acquirement, cease and determine.

Sec. 16. Any city or town owning or operating a plant or plants for the manufacture or distribution of gas or electricity for furnishing light under this act, shall be responsible for any injury or damage to persons or property, happening or arising by reason of the maintenance or operation of the same, in the manner and to the same extent as though the same were owned and operated by an individual or private corporation; but nothing in this act shall be construed to include damages to any existing gas or electric plant in a city or town, by reason of the establishment of a competing line or plant under authority of this act.

Sec. 17. All general laws of the commonwealth, and all ordinances or by-laws of any city or town availing itself of the provis-

ions of this act, relative to the manufacture, use, generation or distribution of gas or electricity, or the quality thereof, or plant or the appliances therefor, shall apply to such city or town, so far as the same may be applicable and shall not be inconsistent with this act, in the same manner as the same apply to persons and corporations engaged in making, generating or distributing gas or electricity therein.

SEC. 18. Nothing herein shall be construed to take away, restrict or impair any rights of any city, town or other authority which may now exist to revoke location of wires, poles, conduits or pipes, in over or under their streets or ways; provided, however, that no city or town having within its limits the main gas works in the case of a gas plant, or the central lighting station in the case of an electric light plant, or the major portion of the wires, poles, conduits or pipes used in connection with any such works or plants, shall, except for violation of the terms or conditions upon which the same were granted, or for a violation of law respecting the exercise thereof, revoke any rights heretefore granted, or which may hereafter be granted, to any person or corporation engaged in the business of making, generating or distributing gas or electricity for sale for lighting purposes, after the first passage by the city council, in the case of a city, of the vote provided for by Section 2, or while such vote is pending in either branch thereof, or in the case of a town after the passage of the first vote provided for in Section 3, or after the calling of a town meeting at which the passage of such vote is included in the warrant; provided, however, that in case in either a city or town the second vote provided for by this act shall fail of passage or in a city shall fail to receive the approval of the mayor or the ratification of the voters, in accordance with this act, then such city or town may exercise all rights of revocation, if any, which it possessed prior to the passage of such first vote until such first vote is again passed, or pending or included in the warrant as above provided.

And after the passage and ratification of both votes as provided in Section 2 by a city, and after the passage of both votes as provided by Section 3 by a town no such city or town shall, except as hereinbefore provided, revoke, any rights, locations or licenses granted to any such person or corporation.

APPENDIX C.

The Tennessee Law Authorizing Municipal Ownership.

APPROVED BY GOV. BUCHANAN MARCH 3, 1891.

House Bill 116.

An Act to authorize municipal corporations created and organized under the act of the General Assembly, being Chapter 114 of the Acts of 1883, passed March 21, 1883, and approved March 27, 1883, to issue bonds for the building and equipping or purchasing a gas plant and system of gas works, and to secure the payment of all such bonds so issued.

SECTION 1. *Be it enacted by the General Assembly of the State of Tennessee*, That the mayor and city council of any incorporated city or town in the state of Tennessee, created and organized under the act of the General Assembly, being Chapter 114 of the Acts of 1883, passed March 21, 1883, and approved March 27, 1883, are hereby empowered in their corporate capacity to issue the bonds of said city or town, signed by the mayor and countersigned by the comptroller, with interest coupons attached, which shall be signed by the treasurer of said city or town, not exceeding $600,000.

SEC. 2. *Be it further enacted*, That the bonds herein provided for may be of denomination from $100 to $1,000, and shall mature at such time within forty years as may be fixed by corporate ordinances, bearing interest at the rate of 6 per cent. per annum, payable semi-annually; and said bonds and coupons may, if the mayor and city council so select, be made receivable for taxes due said city or town.

SEC. 3. *Be it further enacted*, That said bonds shall be known as "the gas work bonds," and shall be used exclusively for building and equipping or purchasing a gas plant and system of gas works for said corporation so issuing said bonds.

SEC. 4. *Be it further enacted*, That the bonds so issued shall be and constitute a first lien on the gas plant and system of gas works so built and equipped or purchased, and said entire gas plant and system of gas works shall be and remain security for the payment of said bonds and the interest accruing thereon.

SEC. 5. *Be it further enacted*, That for the further security of the payment of said bonds the entire surplus receipts of the gas works, over and above the running expenses, shall be used in the extension of the works or shall constitute a trust fund for the entire period said bonds or any of them are to run, and the same shall be applied exclusively to the extension of said works or to the payment of said bonds as the same may mature.

SEC. 6. *Be it further enacted*, That none of said bonds authorized to be issued by this act shall be sold or exchanged for less than their face or par value.

SEC. 7. *Be it further enacted*, That this act take effect from and after its passage, the public welfare requiring it.

Passed February 25, 1891.

APPENDIX D.

Report on the Cost of Gas in Nashville, Tenn.

BY R. D. WOOD & CO.

PHILADELPHIA, November 22, 1890.

Mr. E. R. Richardson, Chairman Finance Committee of City Council, Nashville, Tenn.—

DEAR SIR: Acting on your instructions, we visited Nashville, arriving there on the 3d inst., and made a careful examination of the city and the facilities for delivery there of coal and oil, price of residuals and other data bearing on the manufacture of gas in that city.

The population, according to the recent census, is 76,000, of which not more than one-third are colored. The population in 1880 was 43,500, and in 1870 25,800, showing an increase of about 75 per cent. in each decade. The part of the city across the Cumberland river, which is called Edgefield, contains about one fifth of the total population.

The city is very nicely laid out for easy distribution of gas, and the only drawbacks are changes in elevation, amounting to about 110 feet (equal to a variation of about $1\frac{1}{15}$ inches of water pressure), and that most of the city and all of the principal consumption is on limestone, which will require blasting for laying mains and some services. It is not, however, a hard rock, and, owing to the geographical position of Nashville, the mains would not require laying to a greater depth than would be sufficient to guard them from damage by street traffic.

The information we obtained in regard to the business of the present gas company is contained in an appendix to this report, and is, in the main, we believe, reliable, except in the following particulars.

We learned, on very good authority, that the consumption on November 3 was 465,000 feet, or thereabouts. Judging from other cities, this should give a

YEARLY CONSUMPTION OF ABOUT 125,000,000 FEET.

The number of consumers is stated to be 2,700. The city buys 10,000,000 feet per year, and, taking the consumption at only 100,000,000 feet, this would leave 90,000,000 feet to the private consumers—$189,000 divided by 2,700 is $70 each, which is a very high average. We judge there are at least 3,500 consumers, which would equal one in twenty-two of the population, or say two houses in every seven.

The coal used in the old gas works is a Tennessee coal from the Bon Air mines in the Cumberland mountains. It is we believe, a good gas coal, but no price could be obtained from the coal company or from any other source.

Lima oil is used, we understood, for enriching the gas, as is the case in many of the cities on the Ohio river. From one-half to one gallon is used per 1,000 feet of gas made.

Owing to the difficulty of estimating cost and value of the Tennessee coal, we have based our estimate on Youghiogheny coal at 10¼ cents per bushel of 76 pounds, a price quoted by reliable Pittsburg shippers. Lima oil we estimate at 2¼ cents per gallon. These prices include delivery in Nashville.

By direction of the Committee in Nashville, we

HAVE ESTIMATED THE WORKS

for a capacity of 100,000,000 per year, with facility to enlarging to about 200,000,000 at a comparatively small additional expense. The distributing system is laid out with a view to increasing its capacity to 300,000,000 by laying one additional large main diagonally through the city of about twenty inches diameter, with lateral connections. This main will require to be about 1¼ miles long. The system as laid out on the plan would have a capacity of about 200,000,000, supposing the city to grow rapidly from a common center, as appears to be probable.

The proposed location of the works is a very good one, and the size of the block is at least twice as large as will be required for present purposes.

The mains as laid down on the plan show only the main arteries, and in our estimate we have included for laterals, in addition to mains shown on plan, 27,000 feet of six inches and 26,500 feet of four inches. The location of these lateral mains can be better decided by the engineer in charge of laying them, as it was impossible for us

to familiarize ourselves with all the details of the needs of nearly 100 miles of streets in the limited time at our disposal. The streets, with the exception of about one mile of granite blocks, are paved with macadam.

The cost of laying mains in rock and earth, will, of course, vary enormously, depending upon the proportions of each kind of excavation, and on this point we have taken the opinion of Mr. Jowett, the city engineer, which is based on his experience of the cost of laying the mains, and is, therefore reliable. His estimate is 33 cts. per foot average for labor and cost of blasting. We think this price is quite high enough.

The candle power of the proposed gas is estimated at about eighteen. No estimate has been made of cost of any other process than coal, as this is preferred by members of the committee, and, for the candle power required, is doubtless as cheap as any.

A credit of fifteen cents per ton of coal carbonized has been allowed in cost estimate of gas, for ammonical liquor, but if satisfactory arrangements can be made in Nashville in regard to freight or concentrating it, a much better price can be realized.

VALUE OF THE PLANT.

The accompanying plan shows the general arrangement of the works, and our estimate on same and distribution system is as follows—

Retort house—Condenser room and engine room building 60 x 150 feet inside, by 24 feet high, stone foundation, brick walls 20 inches thick, iron roof frame, slate roof, cellar under condenser room, retort house flagged, condenser and engine room floored with yellow pine, foundations for benches, engine and boilers	$14,500
Purifying house—Meter room and office building 54 x 100 feet inside by 28 feet high, stone foundation, brick walls 20 to 16 inches thick, wood roof frame and slate, yellow pine floor at purifier level, cellar concreted, foundations for purifiers and meter	10,500
Two brick tanks for 300,000 feet holders	45,000
Two 300,000 feet gas holders	40,000
Machinery and apparatus, consisting of 20 benches of 6 retorts each, half million feet standard scrubber, 1 tubular water condenser 1½ million capacity, 4 purifiers 20 x 20 inches, 16 center value; oxide trays and connections and two 20 x 20 inch lime purifiers and valves, two cover lifters, ¾ million feet station meter, one engine and one 40,000 per hour exhauster, two seventy-five horse-power boilers, street governor, 20 inches, 16-inch pipe connections and by-passes round works, 2 pressure registers, Bunsen photometer, jet photometer, pressure gauges, thermometer and miscellaneous apparatus	70,250
Fences and gates, drains, grading, etc	3,000
Coal hoisting apparatus	3,500
Tar well and miscellaneous outbuildings and scales	2,000
Coal shed, 4,000 tons	4,500
Real estate	50,000
	$243,000

Street mains—5,000 feet 20-inch, 11,600 feet 16-inch, 1,700 feet 12-in., 16,400 feet 10-inch, 17,300 feet 8-inch, 31,480 feet 6-inch, 265,000 ft. 4-inch, (348,480 feet—66 miles)—8,600,000 pounds, at 1⅓ cents, or $26.66 per net ton, delivered on streets	$114,666	
Drips and specials, 180,000 pounds, at 2½ cents	4,500	
Lead, 260,000 pounds, at 5 cents	13,000	
Laying 348,480 feet, at 33 cents	116,160	
3,500 meters and services at $16	56,000	
		304,326
Total		$547,576

It is not intended that any charge shall be made to consumers for services or meter rents.

About $60,000 additional would duplicate all apparatus necessary to make 200,000,000 feet per year, and also add one new 300,000 feet holder and tank; $900,000 would, therefore, be a very ample capitalization of the works, particularly as all figures are ample, and there would be no difficulty in contracting for the work at the prices given.

If it should be found that ammonia will not pay to extract for sale, a much cheaper scrubber can be substituted.

We suppose the city will furnish office room in some of the city buildings for the transaction of the gas company's business, and we have not, therefore, estimated any cost for this.

The purifying house and retort house can be extended by adding to the ends of the buildings, should it ever become necessary, at comparatively small expense.

No 3 inch cast iron mains have been included in the estimate, as the capacity of the 4 is more than 2½ times that of the 3.

We have made several estimates of the cost of gas delivered to the consumer, and are quite sure that 80 cents per 1,000 is sufficient to cover all expenses, except interest and taxes, provided the yearly consumption is 100,000,000 feet. This allows for 12 per cent. leakage. The cost at which the city could just sell the gas, without making a loss would then be as follows—

100,000,000 feet, at 80 cents per 1,000	$ 80,000
Interest at 4½ per cent. on $600,000 bonds	27,000
Payment to sinking fund at 2 per cent	12,000
State and county tax estimated at 1 per cent. on capital	6,000
	$125,000

Or $1.25 per thousand.

This cost may seem high compared with the price the city is now paying for its gas, but it must be remembered that the works would practically be paying a 6½ per cent. dividend, and that in upward of forty years the sinking fund would obliterate the entire cost of the

gas works and reduce the cost of gas by thirty-nine cents per 1,000, for interest and sinking fund payments, and this without any estimate of any increase in consumption.

We believe the above covers all the points upon which the committee desire information, and is respectfully submitted.

R. D. WOOD.

APPENDIX.

Nashville, Tenn. — Population 76,000; population 1880, 43,500. Colored population about one-third. Edgefield, across the river, contains about 20 per cent. of total population.

Gas consumption—100,000,000. November 3 makes 465,000; 800 lamps, $1.05; city pays lighting and cleaning, about $5,000. Electric light and gas light cost the city about $50,000. All lamps will shortly be replaced by electric light. Private consumers, $2.10.

Candle Power—About 18. Miles mains, about 50; consumers, 2,700. Gas company gets 3 cents a gallon for tar, $5 a ton for coke and have no ammoniacal liquor. Use Bon Air coal (Tennessee) and Lima oil for enricher. Have in works 20 benches of simes; in use, 8 benches; one large holder and two small ones. Total storage, about 450,000 to 500,000 feet. Charge, 10 cents a month meter rent. Put in services for nothing.

Streets—Average width to building line about 50 feet. Broad street, 94 feet to 104 feet. One mile of granite pavement. All the rest macadam, made of limestone. Residence lots 40 to 50 feet; stores, 18 to 40 feet; 4,500 feet from works to centre of largest consumption; about 75 per cent. of total consumption contained within a space 5,000 feet by 12,000 feet. Greatest variation in grade about 110 feet. Most of pipes are in limestone rock, except Edgefield. Water pipes laid two feet from top to surface.

Prices—Brick work in mortar, $9 to $10. Lime, 20c per bushel, retail; slating, $10.50 per square; tin roofing, 7 to 8 cents; concrete, 4.50 per yard; stone foundation in lime and cement, $3.25 to $3.50.

State Railroad Commissions,

AND

HOW THEY MAY BE MADE EFFECTIVE.